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(54) [Title of Invention] FLUORESCENT OBSERVATION DEVICE

[Problem to be Solved] To observe a lesion existing at a depth inside an organism.

[Solution] A fluorescent observation device 1 includes an optical probe 3 formed from a needle sheath 2 which is rigid only at the tip inserted into the organism, and flexible at others; an excitation light source 4 which supplies excitation light for fluorescent observation to optical probe 3; a controller 5 which controls the supply of the excitation light from the excitation light source 4 to the optical probe 3; and a spectrometer 6 for diagnosing a tissue using auto-fluorescence from a lesion at a depth in the organism caused by excitation light from the optical probe 3. A first conduit 7 and a second conduit 8 are formed in the interior of needle sheath 2 of optical probe 3, and a first fiber-optic cable 9 is distributed in first conduit 7 to transmit the auto-fluorescence from the lesion at a depth of the organism to the spectrometer 6; as is a second fiber-optic cable 10 in second conduit 8 to transmit the excitation light from excitation light source 4.

[Diagram]

4. Excitation light source
5. Controller
6. Spectrometer

[Claim(s)]

[Claim 1] In relation to fluorescent observation devices for illuminating organic tissue with excitation light to makes observations of said organic tissue by the fluorescent light emitted by said organic tissue,

a fluorescent observation device characterized by being equipped with

a needle-shaped sheath inserted deep into organic tissue,

and an ultrasonic observation instrument used to confirm the insertion condition of said needle-shaped sheath in said deep organic tissue,

and having an irradiative fiber-optic cable for transmitting said excitation light and an observational fiber-optic cable for transmitting the fluorescent light emitted by said organic tissue formed through the interior of said needle-shaped sheath.

[Description of the Invention]

[0001]

[Technological Field of the Invention] The present invention is associated with fluorescent observation devices which irradiate the test subject with excitation light so that diseased parts can be observed using the fluorescence emitted by the test subject; more specifically, it is associated with fluorescent observation devices with a characteristic in the part that irradiates the test subject with excitation light.

[0002]

[Prior Art] In recent years, there has been increasing use of technology in which the observational target area of organic tissue is irradiated with excitation light, and the auto-fluorescence emitted directly by the organic tissue due to excitation light, or the fluorescence of a substance injected into the organism, is extracted as a 2-dimensional image, and diagnoses of degradation of organic tissue and the condition of diseases such as cancer (for example, the type of disease and the extent of infiltration) are made from this fluorescence image. As shown in Publication of Unexamined Patents Number H8-252218, for example, a variety of fluorescent observation devices for conducting this fluorescence observation have been proposed.

[0003] Auto-fluorescence occurs when biological tissue irradiated with excitation light emits fluorescent light with wavelength longer than that of the excitation light. Examples of biological matter capable of florescence include collagen, NADH (nicotinamide adenine dinucleotide), FMN (flavin mononucleotide), and pyridine nucleotide. Nowadays, it is possible to diagnose diseases such as cancer through fluorescence, as there is a clearer understanding of the

correlation between diseases and the fluorescence of internal biological matter.

[0004] In the case of fluorescent pharmaceuticals, HpD (hematoporphyrin), Photofrin, and ALA (δ-amino levulinic acid), for example, are used as fluorescent substances injected into the organism. These pharmaceuticals tend to accumulate in cancerous cells; hence the diseased area can be diagnosed by injecting these substances into the body and examining the fluorescent areas. In another method, fluorescent substances are attached to monoclonal antibodies, and the fluorescent substances accumulate in the diseased area through antigen-antibody reactions.

[0005] As excitation light, lasers, mercury lamps, and metal halide lamps, for example, are used, and by irradiating organic tissue with excitation light, fluorescence images of the observational target areas are obtained. Observations and diagnoses are conducted by extracting the weak fluorescent light emitted by the organic tissue due to excitation light and producing a 2-dimensional fluorescence image.

[0006]

[Problem to be Solved] The problem, however, is that in existing fluorescent observation devices described in the Publication of Unexamined Patents Number H8-252218, an organism's surface tissue is irradiated with excitation light, and the auto-fluorescence emitted from the organism's surface tissue is observed endoscopically, so that only lesions existing on the surface of the organism can be observed, and lesions existing at a depth inside the organism cannot be observed.

[0007] The present invention was created in response to the conditions outlined above, and has the objective of providing a fluorescent observation device capable of observing lesions that exist at a depth inside an organism.

[0008]

[Solution] In relation to fluorescent observation devices for illuminating organic tissue with excitation light to makes observations of said organic tissue by the fluorescent light emitted by said organic tissue, the fluorescent observation device of the present invention is equipped with a needle-shaped sheath inserted deep into organic tissue and an ultrasonic observation instrument used to confirm the insertion condition of said needle-shaped sheath in said deep organic tissue, and has an irradiative fiber-optic cable for transmitting said excitation light and an observational fiber-optic cable for transmitting the fluorescent light emitted by said organic tissue formed through the interior of said needle-shaped sheath.

[0009] The fluorescent observation device of this invention allows observation of lesions existing at a depth inside an organism by inserting said needle-shaped sheath in said deep organic tissue, confirming the insertion condition of said needle-shaped sheath in said deep organic tissue using said ultrasonic observation instrument, and at the same time, transmitting said excitation light to said organic tissue through said irradiative fiber-optic cable, and transmitting the fluorescent light emitted from said organic tissue using said observational fiber-optic cable.

[0010]

[Embodiments of the Invention] The embodiments of this invention will be explained below with reference to drawings.

[0011] (First Embodiment) Figure 1 to Figure 3 are associated with the first embodiment of this invention. Figure 1 is a schematic diagram showing the constitution of the fluorescent observation device, Figure 2 is a schematic diagram showing the constitution of the convex ultrasonic endoscope, used in the fluorescent observation device, through which the optical probe in Figure 1 is inserted, and Figure 3 shows the monitor used to display the ultrasonic image obtained by the convex ultrasonic endoscope of Figure 2.

[0012] (Constitution) As shown in Figure 1, the fluorescent observation device 1 of the present embodiment includes an optical probe 3 consisting of a needle-shaped sheath 2 which is flexible except at the rigid tip which is inserted into the organism; an excitation light source 4 which supplies the excitation light used for fluorescence observation to optical probe 3; a controller 5 which controls the supply of the excitation light from excitation light source 4 to optical probe 3; and a spectrometer 6 which is used to diagnose tissue using the auto-fluorescence emitted by a lesion at a depth in the organism due to the excitation light from optical probe 3.

[0013] A first conduit 7 and a second conduit 8 are formed in the interior of needle-shaped sheath 2 of optical probe 3, and a first fiber-optic cable 9 connected to spectrometer 6 is distributed in first conduit 7 to transmit the auto-fluorescence from the lesion at a depth of the organism to spectrometer 6, as is a second fiber-optic cable 10 in second conduit 8 to transmit the excitation light from excitation light source 4.

[0014] As shown in Figure 2, optical probe 3 is inserted within conduit 16 of convex ultrasonic endoscope 15. which is equipped with ultrasonic receiver 14 with ultrasonic vibrators positioned in a convex arc in toward the insertion direction in relation to objective optic module 13 formed inside tip 11 to make optical observations of organic tissue 12. In fluorescent observation device 1, convex ultrasonic endoscope 15, not shown, is connected to the observational light source which supplies observational illumination and to the ultrasonic observation device which transmits ultrasound via ultrasonic receiver 14 and generates an ultrasonic image; and is constituted such that it is possible to confirm the condition of the insertion of optical probe 3 in organic tissue 12, for example by observing the optical image of organic tissue 12 in the body cavity through an ocular unit while displaying the ultrasonic image from the ultrasonic observation device on an external monitor as shown in Figure 3.

[0015] (Operation) Next, the operation of fluorescent observation device 1 constituted according to the present embodiment will be explained.

[0016] Optical probe 3 of fluorescent observation device 1 is inserted into organic tissue 12 via conduit 16 of convex ultrasonic endoscope 15. At this time, the ultrasonic image at a depth in organic tissue 12 is displayed on external monitor 17 connected to convex ultrasonic endoscope 15, and the operator guides optical probe 3 while confirming that optical probe 3 is securely inserted in lesion 18 deep inside organic tissue 12 (refer to Figure 3).

[0017] Then, when the operator confirms that optical probe 3 has been inserted securely into targeted lesion 18 deep inside organic tissue 12, the operator manipulates the externally installed controller 5, so that the excitation light is transmitted from excitation light source 4 to lesion 18, and this excitation light is irradiated onto lesion 18 deep inside organic tissue 12 via second fiber-optic cable 10.

[0018] When lesion 18 deep inside organic tissue 12 is irradiated by the excitation light, it emits auto-fluorescence, and the auto-fluorescence is guided into the externally installed spectrometer via first fiber-optic cable 9. Then, by reading spectrometer 6, the operator conducts fluorescence observation of lesion 18 deep inside organic tissue 12.

[0019] (Effects) In this embodiment of fluorescent observation device 1, the fluorescence from not only the surface of organic tissue 12, but from lesion 18 deep inside organic tissue 12, can be observed by inserting optical probe 3 in lesion 18 at a depth in organic tissue 12. Also, because the insertion condition of optical probe 3 deep inside organic tissue 12 is observed by convex ultrasonic endoscope 15, the operator can insert the optical probe securely in lesion 18.

[0020] Also, in this embodiment, convex ultrasonic endoscope 15 is used to confirm the insertion position of optical probe 3, but the insertion position of optical probe 3 can be confirmed by radial or linear ultrasonic endoscopes as well before conducting fluorescence observation of lesion 18 deep inside organic tissue 12.

[0021] (Second Embodiment) Figure 4 is a schematic diagram showing the constitution of the fluorescent observation device associated with the second embodiment of the present invention.

[0022] The second embodiment is almost identical to the first embodiment, so only the differences will be explained, and where the

constitution is identical, the same symbols will be used, and explanations will be omitted.

[0023] (Constitution) As shown in Figure 4, in fluorescent observation device 1a of the present embodiment, a third conduit 21, in addition to a first conduit 7 and a second conduit 8, is formed inside a needle-shaped sheath 2 of an optical probe 3, and this third conduit 21 is connected to syringe 24 and 25 installed in the exterior to allow injections of pharmaceutical 22 used in fluorescent diagnosis and therapeutic pharmaceutical 23, such that by controlling valve 26, each can be selectively supplied to third conduit 21.

[0024] Also, fluorescent observation device 1a of the present embodiment includes therapeutic light source 27, and uses controller 5 to selectively irradiate/supply excitation light from excitation light source 4 or light from therapeutic light source 27 to second fiber-optic cable 10 formed inside second conduit 8.

[0025] Additionally, hematoporphyrin (HPD) for example can be used as pharmaceutical 22 used in fluorescent diagnosis, and lumin for example can be used as therapeutic pharmaceutical 23.

[0026] The remaining constitution is identical to that of the first embodiment.

[0027] (Operation) Optical probe 3 in this embodiment of fluorescent observation device 1a is, as in the first embodiment, inserted deep inside organic tissue 12 via conduit 16 of convex ultrasonic endoscope 15 (refer to Figure 2). Then, while observing the ultrasonic image from convex ultrasonic endoscope 15 on external monitor 17, optical probe 3 is guided into lesion 18 deep inside organic tissue 12.

[0028] When the operator confirms that optical probe 3 has been inserted into lesion 18 deep inside organic tissue 12, the operator controls valve 26, and injects pharmaceutical 22 used for fluorescent diagnosis from syringe 24 into lesion 18 via third conduit 21. Next, through controller 5, a diagnostic excitation light from diagnostic excitation light source 4 is irradiated onto lesion 18 deep inside organic tissue 12 via second fiber-optic cable 10.

[0029] When this happens, pharmaceutical 22 for fluorescent diagnosis has been injected into lesion 18, so lesion 18 emits fluorescent light. This fluorescent light is guided into externally installed spectrometer 6 via first fiber-optic cable 9 installed inside first conduit 7. Diagnosis of fluorescence from lesion 18 then becomes possible as the operator observes spectrometer 6.

[0030] After the observation of lesion 18 deep inside organic tissue 12 is finished, next, therapeutic pharmaceutical 23 from externally installed syringe 25 is injected into lesion 18 deep inside organic tissue 12 via third conduit 21. Then, the therapeutic light from externally installed therapeutic light source 23 is guided into second fiber-optic cable 10 via controller 5.

[0031] When this happens, the therapeutic light is emitted from optical probe 3 causes a chemical reaction with therapeutic pharmaceutical 23, and treats lesion 18 deep inside organic tissue 12.

[0032] (Effects) In this embodiment of fluorescent observation device 1a, in addition to the effects of the first embodiment, the treatment of lesion 18 deep inside organic tissue 12 is made possible.

[0033] (Third Embodiment) Figure 5 is a schematic diagram showing the constitution of the fluorescent observation device associated with the third embodiment of the present invention.

[0034] The third embodiment is almost identical to the first embodiment, so only the differences will be explained, and where the constitution is identical, the same symbols will be used, and explanations will be omitted.

[0035] (Constitution) As shown in Figure 5, in the present embodiment of fluorescent observation device 1b, a third conduit 31, in addition on a first conduit 7 and a second conduit 8, is formed inside a needle-shaped sheath 2 of an optical probe 3, and this third conduit 31 is connected to a syringe 31 which is installed externally such that therapeutic pharmaceutical 32 can be injected.

[0036] Also, the present embodiment of fluorescent observation device 1b is constituted such that the auto-fluorescent light from lesion 18 deep inside organic tissue 12 transmitted through first fiber-optic cable 9 installed inside first conduit 7 is imaged by a high-sensitivity camera with a built-in image intensifier, the signal is processed by image processor 25, and the fluorescence image of lesion 18 can be observed by an operator using monitor 36.

[0037] Here, the excitation light source 4 controlled by controller 5 uses, for example, helium-cadmium lasers, and the wavelength of the excitation light is 442 nm. Also, titanium oxide (TiO_2) is used as therapeutic pharmaceutical 32.

[0038] The remaining constitution is identical to that of the first embodiment.

[0039] (Operation) Optical probe 3 in this embodiment of fluorescent observation device 1b is, as in the first embodiment, inserted deep inside organic tissue 12 via conduit 16 of convex ultrasonic endoscope 15 (refer to Figure 2). Then, while observing the ultrasonic image from convex ultrasonic endoscope 15 on external monitor 17, optical probe 3 is guided into lesion 18 deep inside organic tissue 12.

[0040] Then, the operator confirms that optical probe 3 has been inserted into lesion 18 deep inside organic tissue 12, and when the insertion into lesion 18 deep inside organic tissue 12 has been confirmed, the 442 nm excitation light used for fluorescence observation is supplied by the externally installed excitation light source.

[0041] This excitation light is irradiated onto legion 18 deep inside organic tissue 12 via second fiber-optic cable 10. When irradiated by the 442 nm excitation light, auto-fluorescence is emitted from deep inside organic tissue 12. This auto-fluorescence is captured by the externally installed high-sensitivity camera 34 via first fiber-optic cable 9, is processed by image processor 35, and lesion 18 is displayed as a fluorescence image on externally installed monitor 36.

[0042] Once the operator has confirmed lesion 18 using monitor 36, the operator next injects lesion 18 deep inside organic tissue 12 with TiO_2, the externally installed therapeutic pharmaceutical 32, via third conduit 31. Then, the operator irradiates lesion 18 deep inside organic tissue 12 with the 442 nm light from excitation light source 4 consisting of a helium-cadmium laser via second fiber-optic cable 10. Because TiO_2 of therapeutic pharmaceutical 36 has been injected deep inside organic tissue 12, the 442nm light emitted by the excitation light source 4 causes an oxidation-reduction reaction, and treats lesion 18 deep inside organic tissue 12.

[0043] (Effects) In this embodiment of fluorescent observation device 1b, as in the second embodiment and in addition to the effects of the first embodiment, the treatment of lesion 18 deep inside organic tissue 12 is made possible. Also, compared to the second embodiment, one light source acts as both the therapeutic light source and the diagnostic light source, which allows a reduction in the size of the design. Additionally, diagnostic capabilities are increased because information from deep inside organic tissue 12 is displayed as an image.

[0044] (Fourth Embodiment) Figure 6 is a schematic diagram showing the constitution of the fluorescent observation device associated with the fourth embodiment of the present invention.

[0045] (Constitution) As shown in Figure 6, fluorescent observation device 51 of the present embodiment includes endoscope 54 possessing an MR antenna 54 inside the tip of insertion unit 52 which is inserted inside the body cavity of the subject; a light source 56a which supplies excitation light used for fluorescence observation to endoscope 54 and a light source 56 equipped with amplifier 55 which amplifies the MR signal from MR antenna 53; a high-sensitivity camera 57, with a built-in intensifier, which images the auto-fluorescent light emitted by the organic tissue stimulated by the excitation light used for fluorescence observation; an MR image processor 58 in which a subject placed in a static magnetic field, and a high-frequency magnetic field is generated using MR antenna 53, and at the same the MR signal from MR antenna 53, amplified by amplifier 55, is used to generate an MR image; and a fluorescence image processor 59 which produces a fluorescence image from the image signal imaged by high-sensitivity camera 57, and is configured

such that it displays the MR image and fluorescence image produced by MR image processor 58 and fluorescence image processor 59 on monitor 60.

[0046] In endoscope 54, a removable universal cable 62 stretches out from grip 61, formed at the end of insertion unit 52, such that it can be attached and removed from light source 56, and configured such that the excitation light for fluorescence observation from light source 56 is transmitted through light guide 63 which runs through the interior of universal cable 62 and insertion unit 52, and is irradiated onto the organic tissue from the tip of endoscope 54.

[0047] Also, a signal line 64 connected to MR antenna 53 is distributed inside universal cable 62 and insertion unit 52, and configured such that the detection signal from MR antenna 53 is transmitted by this signal line 64 to the amplifier inside light source 56.

[0048] Furthermore, an image guide 65 is formed inside insertion unit 52 and grip 61, and is configured such that the auto-fluorescence from the organic tissue stimulated by the excitation light for fluorescence observation is relayed to removable ocular unit 66 connected to high-sensitivity camera 57.

[0049] (Operation) Next, the operation of fluorescent observation device 51 constituted as in the present embodiment is explained.

[0050] The subject is placed in a static magnetic field, and insertion unit 52 of endoscope 54 is inserted into the body cavity. Then, the excitation light for fluorescence observation is shone out from light source 56, and the excitation light is irradiated, from the tip of endoscope 54 via light guide 63, onto the organic tissue. When the organic tissue is irradiated by the excitation light, auto-fluorescent light is emitted by the organic tissue, and this auto-fluorescent light is sent to high-sensitivity camera 57 via image guide 65. Then, external fluorescence image processor 59 processes the image, and monitor 60 displays the fluorescence image.

[0051] Also, a high-frequency signal at a prescribed frequency is sent from MR image processor 58 to MR antenna 53 built into endoscope 54, and a high-frequency magnetic field is generated from MR antenna 53 onto the subject. Additionally, the direction of the high-frequency magnetic field that is perpendicular to the direction of the static magnetic field is desirable. Then, the MR signal from the subject is received by MR antenna 53, amplified by amplifier 55, and information along the depth of the lesion being observed fluorescently is obtained. This signal is guided into MR image processor 58, and is displayed on monitor 60 as an MR image.

[0052] As a result, the operator makes observations of the organism's surface and along its depth by the fluorescence image and MR image displayed on monitor 60.

[0053] (Effects) In this embodiment of fluorescent observation device 51, information about the lesion's surface can be observed as a fluorescence image, and also, because information along the depth of the lesion can be observed as an MR image, not only information about the organism's surface, but information along the depth of the organism can be observed, resulting in an increase in diagnostic capabilities.

[0054] (Fifth Embodiment) Figure 7 and Figure 8 are associated with the fifth embodiment of the present invention. Figure 7 is a schematic diagram showing the constitution of the optical probe of the fluorescent observation device, and Figure 8 is a schematic diagram showing the constitution of the endoscope with the optical probe in Figure 7 inserted through the conduit.

[0055] The fifth embodiment is almost identical to the fourth embodiment, so only the differences will be explained, and where the constitution is identical, the same symbols will be used, and explanations will be omitted.

[0056] The fourth embodiment includes an endoscope with an MR antenna installed inside the tip, but in this embodiment, the fluorescent observation device is configured with an ordinary endoscope through which an optical probe, equipped with an MR antenna, is inserted.

[0057] Namely, as shown in Figure 7, optical probe 71 of the present embodiment is equipped with a built-in image guide 72 which transmits the fluorescence image from the organic tissue; and a first MR antenna 73 formed around the exterior circumference, and a second MR antenna 74 formed along the direction of insertion, of image guide 72 for observing information at a depth in the organism.

[0058] Then, as shown in Figure 8, an optical probe 71 is inserted in and protruded out the tip of conduit 82 of endoscope 81 which is inserted in the body cavity, and by this, fluorescence images and MR images are obtained.

[0059] In addition, through not shown, [the fifth embodiment is configured] as in the fourth embodiment such that the excitation light for fluorescence observation from light source 56 is supplied to light guide 83 of endoscope 81; image guide 72 of optical probe 71 transmits the fluorescent light from the organic tissue, which is imaged by high-sensitivity camera 57 and processed by fluorescence image processor 59; and furthermore, the MR signals from first MR antenna 73 and second MR antenna 73[74] are processed at MR image processor 58; and the MR image and fluorescence image produced by MR image processor 58 and fluorescence image processor 59 are displayed on monitor 60.

[0060] (Operation) In the fluorescent observation device constituted as in the present embodiment, the subject is place inside a static magnetic field, and endoscope 81 is inserted into the organic cavity of interest. Next, optical probe 71 is inserted inside conduit 82 of endoscope 81.

[0061] Then, the excitation light for fluorescence observation from light source 56 is irradiated onto the organic tissue from light guide 83 of endoscope 81. Due to the irradiation of the organic tissue with the excitation light, auto-fluorescent light is emitted by the organic tissue.

[0062] This auto-fluorescent light is imaged by high-sensitivity camera 57 via image guide 72 formed inside optical probe 71, guided into fluorescence image processor 59, and the fluorescence image is displayed on monitor 60.

[0063] Also, by processing the MR signal, obtained by first MR antenna 73 and second MR antenna 73 formed on optical probe 71, at MR image processor 58, a 3-dimensional MR image can similarly be displayed on monitor 60.

[0064] (Effects) This embodiment of the fluorescent observation device, compared to the fourth embodiment, allows the use of an existing endoscope 81 because optical probe 71 is inserted through conduit 82 on endoscope 81 in order to conduct fluorescence observation. Additionally, because it uses optical probe 71, there is great freedom to observe lesions at desired locations. Also, 3-dimensional observations of the organism along its depth are possible because it is equipped with two MR antennae.

[0065] (Sixth Embodiment) Figure 9 to Figure 11 are associated with the sixth embodiment of the present invention. Figure 9 is a schematic diagram showing the constitution of the fluorescent observation device's endoscope with the optical probe inserted through the conduit, Figure 10 is a schematic diagram showing the constitution of the first variation of the endoscope with the optical probe of Figure 9 inserted through the conduit, and Figure 11 is a schematic diagram showing the constitution of the second variation of the endoscope with the optical probe of Figure 9 inserted through the conduit.

[0066] The sixth embodiment is almost identical to the fourth embodiment, so only the differences will be explained, and where the constitution is identical, the same symbols will be used, and explanations will be omitted.

[0067] (Constitution) In the fourth embodiment, the endoscope uses an MR antenna formed inside the tip, but in this embodiment, as shown in Figure 9, the fluorescent observation device includes an endoscope 93, which consists of a first conduit 91 and a second conduit 92; an optical probe 95, which includes an image guide 92 which transmits the fluorescence image from the organic tissue, and is inserted through first conduit 91; and an MR probe 97, which

includes an MR antenna 96, and is inserted through second conduit 92.

[0068] In addition, though not shown, as in the fourth embodiment, the excitation light for fluorescence observation from light source 56 is supplied to a light guide 98 in endoscope 93; the fluorescent light from the organic tissue is transmitted by an image guide 94 in optical probe 95 to high-sensitivity camera 57 where it is imaged, and processed at fluorescence image processor 59; and by processing the MR signal from MR antenna 96 at MR image processor 58, the MR image and fluorescence image generated by MR image processor 58 and fluorescence image processor 59 are displayed on monitor 60.

[0069] (Operation) In the fluorescent observation device constituted as in the present embodiment, the subject is placed inside a static magnetic field, and endoscope 93 is inserted in the targeted organic body cavity. Next, optical probe 95 is inserted inside first conduit 91, and MR probe 97 is inserted inside second conduit 92 of endoscope 93.

[0070] Then, from light guide 98 of endoscope 93, the excitation light for fluorescent observation from light source 56 is irradiated onto the organic tissue. Due to the irradiation of the organic tissue by the excitation light, the organic tissue emits auto-fluorescent light.

[0071] This auto-fluorescent light is imaged by high-sensitivity camera 57 via image guide 94 formed inside optical probe 95, guided into fluorescence image processor 59, and displayed on monitor 60 as a fluorescence image.

[0072] Also, by processing the MR signal, obtained by MR antenna 96 formed in MR probe 97, at MR image processor 68, the MR image is similarly displayed on monitor 60.

[0073] (Effects) In the present embodiment, as in the fourth embodiment, information about the lesion's surface can be observed as a fluorescence image, and also, because information along the depth of the lesion can be observed as an MR image, not only information about the organism's surface, but information along the depth of the organism can be observed, resulting in an increase in diagnostic capabilities.

[0074] Information along the depth can also be observed using an ultrasonic probe instead of MR probe 97.

[0075] Also, the fluorescent observation device can be constituted with an endoscope 102 possessing a large-diameter large conduit 101, as shown in Figure 10, instead of endoscope 93 possessing first conduit 91 and second conduit 92 as shown in Figure 9; and in this case, a semi-circular MR probe 104 with MR antenna 103 inserted through it, and a semicircular optical probe 106 with image guide 105 inserted through it are inserted into large conduit 101. Even with this constitution, operations and effects identical to the present embodiment can be obtained

[0076] Furthermore, operation and effects identical to the present embodiment can be obtained by a fluorescent observation device constituted such that in large conduit 101 in endoscope 102, as shown in Figure 11, a hollow MR probe 111 with built-in MR antenna 103 is inserted, and at the same time, an optical probe 112 with built-in image guide 105 is inserted inside the hollow part of said MR probe 112.

[0077] (Seventh Embodiment) Figure 12 is a schematic diagram showing the fluorescent observation device associated with the seventh embodiment of the present invention.

[0078] (Constitution) The present embodiment is an application of fluorescent observation to surgical treatment, and as shown in Figure 12, in a rigid endoscope 122 possessing a rigid insertion unit 121 which is inserted inside the body cavity via abdominal wall 120, a first conduit connector 124 and a second conduit connector 125 connected to a first conduit and a second conduit (not shown) installed inside insertion unit 121 are installed on grip 123 formed on the end of insertion unit 121, and on ocular unit 126 formed on grip 123, a high-sensitivity camera with built-in image intensifier is connected so that it can be freely connected and removed.

[0079] Then, the present embodiment of fluorescent observation device 130 includes said rigid endoscope 122; a fluorescence image processor 132 which processes the signal from high-sensitivity camera 127 and displays a fluorescence image on a monitor 131; an excitation light source 133 which is connected to grip 123 and supplies the excitation light to said rigid endoscope 122 in order to conduct fluorescence observation; a surgical instrument controller 136 which controls an ultrasonic disintegration probe 135 which is used to treat lesion 134 and is inserted into the first conduit from first conduit connector 124; and a collection jar 137 which collects the disintegrated tissue using the second conduit via second conduit connector 125.

[0080] (Operation) Insertion unit 121 of rigid endoscope 122 is inserted inside the body cavity via abdominal wall 120. Then, the excitation light for fluorescent observation from excitation light source 133 is irradiated onto the inside of the body cavity via the light guide (not shown) of rigid endoscope 122. When this happens, auto-fluorescent light is emitted by lesion 134 on an organ inside the body cavity, and the auto-fluorescent light is transmitted to the high-sensitivity camera via the image guide (not shown) of rigid endoscope 122. Then, after the image has been processed by fluorescence image processor 132, the fluorescence image of lesion 132 is displayed on monitor 131.

[0081] The operator observes the extent of the infiltration of the lesion using the fluorescence image displayed on monitor 131, and then disintegrates lesion 134 by manipulating ultrasonic disintegration probe 135, which is inserted through the first conduit via first conduit connector 124, and surgical instrument controller 136. The disintegrated legion tissue is collected inside the external collection jar 137 from second conduit connector 125 via the second conduit of rigid endoscope 122.

[0082] (Effects) Thus, in the present embodiment of fluorescent observation device 130, confirmation of the location of lesion 134 inside the abdominal cavity, and confirmation of the extent of infiltration are simplified, so that treatment can be conducted reliably.

[0083] [Additional Remarks]

(Additional Article 1) In relation to fluorescent observation devices for illuminating organic tissue with excitation light to makes observations of said organic tissue by the fluorescent light emitted by said organic tissue, a fluorescent observation device characterized by being equipped with a needle-shaped sheath inserted deep into organic tissue and an ultrasonic observation instrument used to confirm the insertion condition of said needle-shaped sheath in said deep organic tissue, and having an irradiative fiber-optic cable for transmitting said excitation light and an observational fiber-optic cable for transmitting the fluorescent light emitted by said organic tissue formed through the interior of said needle-shaped sheath.

[0084] (Additional Article 2) The fluorescent observation device, as defined in Additional Article 1, characterized by being equipped with a surgical instrument which treats the lesion lying at a depth of said organic tissue with a pharmaceutical which reacts to the irradiation by said excitation light transmitted via said irradiative fiber-optic cable

[0085] (Additional Article 3) The fluorescent observation device as defined in Additional Article 2 with the characteristic that said pharmaceutical is a pharmaceutical prepared for PDT.

[0086] (Additional Article 4) The fluorescent observation device as defined in Additional Article 2 with the characteristic that said pharmaceutical is lumin.

[0087] (Additional Article 5) The fluorescent observation device as defined in Additional Article 2 with the characteristic that said pharmaceutical is TiO_2.

[0088]

[Effects of the Invention] As explained above, the fluorescent observation device of this present invention has the effect of allowing observation of a lesion existing at a depth in an organism by inserting a needle-shaped sheath in tissue existing at a depth of an organism, confirming the insertion condition of the needle-shaped sheath in tissue existing at a depth in an organism using an ultrasonic

observation instrument, and at the same time, transmitting excitation light to the organic tissue using irradiative fiber-optic cable, and transmitting the fluorescent light emitted by said organic tissue using the observational fiber-optic cable.

[Brief explanations of the drawings]

[Figure 1] Schematic diagram showing the constitution of the fluorescent observation device associated with the first embodiment of the present invention.

[Figure 2] Schematic diagram showing the constitution of the convex ultrasonic endoscope used in the fluorescent observation device and passing through the optical probe in Figure 1.

[Figure 3] A drawing showing the monitor which displays the ultrasonic image obtained by the convex ultrasonic endoscope of Figure 2.

[Figure 4] Schematic diagram showing the constitution of the fluorescent observation device associated with the second embodiment of the present invention.

[Figure 5] Schematic diagram showing the constitution of the fluorescent observation device associated with the third embodiment of the present invention.

[Figure 6] Schematic diagram showing the constitution of the fluorescent observation device associated with the fourth embodiment of the present invention.

[Figure 7] Schematic diagram showing the constitution of the optical probe of the fluorescent observation device associated with the fifth embodiment of the present invention.

[Figure 8] Schematic diagram showing the constitution of the endoscope with the optical probe of Figure 7 inserted through the conduit.

[Figure 9] Schematic diagram regarding the fifth embodiment of the present invention showing the constitution of the fluorescent observation device's endoscope with the optical probe inserted through the conduit.

[Figure 10] Schematic diagram showing the constitution of the first variation of the endoscope with the optical probe of Figure 9 inserted through the conduit.

[Figure 11] Schematic diagram showing the constitution of the second variation of the endoscope with the optical probe of Figure 9 inserted through the conduit.

[Figure 12] Schematic diagram showing the constitution of the fluorescent observation device associated with the seventh embodiment of the present invention.

[Explanation of Symbols]

1 ··· Fluorescent observation device
2 ··· Sheath
3 ··· Optical probe
4 ··· Excitation light source
5 ··· Controller
6 ··· Spectrometer
7 ··· First conduit
8 ··· Second conduit
9 ··· First fiber-optic cable
10 ··· Second fiber-optic cable
11 ··· Tip
12 ··· Organic tissue
13 ··· Objective optic module
14 ··· Ultrasonic receiver
15 ··· Convex ultrasonic endoscope
16 ··· Conduit
17 ··· External monitor

[Figure 1]
4. Excitation Light Source
5. Controller
6. Spectrometer

[Figure 2]

[Figure 3]

[Figure 4]
4. Excitation Light Source
5. Controller
6. Spectrometer
27. Therapeutic Light Source

[Figure 5]
4. Excitation Light Source
5. Controller
34. High-sensitivity Camera
35. Image Processor
36. Monitor

[Figure 7]

[Figure 8]

[Figure 9]

[Figure 10]

[Figure 11]

[Figure 6]
55. Amplifier
56a. Light Source Unit
57. High-sensitivity Camera
58. MR Image Processor
59. Fluorescence Image Processor
60. Monitor – Fluorescence Image – MR Image

[Figure 12]
131. Monitor
132. Fluorescence Image Processor
133. Excitation Light Source
136. Surgical Instrument controller

Continued from Front Page

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(57)【要約】 (57)[SUMMARY]

【課題】
生体の深部に存在する病変部の観察を行う

[SUBJECT]
To observe the disease part which exists in the deep part of the organism.

【解決手段】
蛍光観察装置1は、生体へ穿刺する先端部のみ硬性で他は可撓性を有する針状のシース2から成る光プローブ3と、蛍光観察を行うための励起光を光プローブ3に供給する励起用光源4と、励起用光源4からの励起光の光プローブ3への供給を制御する制御装置5と、光プローブ3からの励起光による生体深部の病変部からの自家蛍光により組織を診断するスペクトロメータ6とを備えて構成される。光プローブ3の針状のシース2の内部には、第1チャンネル7及び第2チャンネル8が設けられ、第1チャンネル7には生体深部の病変部からの自家蛍光をスペクトロメータ6に伝送する第1の光ファイバ9が、また第2チャンネル8には励起用光源4からの励起光を伝送する第2

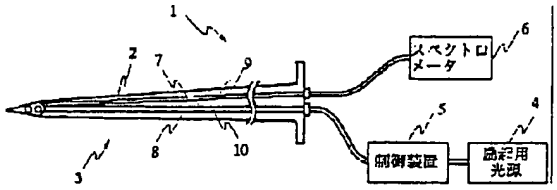
[SOLUTION]
The fluorescent observation apparatus 1, the optical probe 3 with which only the end which transfixes to the organism is hard and needle-like, and the sheath 2 having flexibility, the light source for excitation 4 which supplies the excitation light for performing fluorescent observation to the optical probe 3, the control apparatus 5 which controls supply to the optical probe 3 of the excitation light from the light source for excitation 4, the spectrometer 6 which diagnoses a tissue according to the self-fluorescence from the disease part of the organism deep part by the excitation light from the optical probe 3.

It has these and it is constituted.
The 1st 7 and second channel 8 are provided on the inside of the needle-like sheath 2 of the optical probe 3.

In the 1st channel 7, the first optical fibre 9 which transmits the self-fluorescence from the disease part of the organism deep part to a spectrometer 6, Moreover the 2nd optical fibre

の光ファイバ１０がそれぞれ配設されている。

10 which transmits the excitation light from the light source for excitation 4 in the second channel 8 is respectively arranged.



[translation of Japanese text in Selection Diagram]
refer to EXPLANATION OF DRAWINGS

【特許請求の範囲】

[CLAIMS]

【請求項１】
生体組織に励起光を照射し、前記生体組織から発生する蛍光により前記生体組織を観察する蛍光観察装置において、
生体深部組織に穿刺する針状シースと、
前記針状シースの前記生体深部組織への穿刺状態を確認する超音波観察手段とを備え、
前記針状シースの内部に前記励起光を伝送する照明用光ファイバと、前記生体組織から発生する蛍光を伝送する観察用光ファイバとを設けたことを特徴とする蛍光観察装置。

[CLAIM 1]
Excitation light is irradiated to an organism tissue.
In the fluorescent observation apparatus which observes the above-mentioned organism tissue according to the fluorescence generated from the above-mentioned organism tissue, the needle-like sheath which transfixes to an organism deep-part tissue, and ultrasonic observation means to confirm the transfixed state to the above-mentioned organism deep-part tissue by the above-mentioned needle-like sheath. It has these.

The optical fibre for illumination which transmits above-mentioned excitation light inside the above-mentioned needle-like sheath, and the optical fibre for observation which transmits the fluorescence generated from the above-mentioned organism tissue were provided.

The fluorescent observation apparatus characterized by the above-mentioned.

【発明の詳細な説明】

[DETAILED DESCRIPTION OF INVENTION]

【０００１】

[0001]

【発明の属する技術分野】

本発明は被検査対象に励起光を照射し被検査対象から発する蛍光より疾患部位を観察する蛍光観察装置、更に詳しくは被検査対象への励起光の照射部分に特徴のある蛍光観察装置に関する。

[TECHNICAL FIELD]

This invention is fluorescent observation apparatus which observes an illness site from the fluorescence which excitation light is irradiated for a tested object and emitted from a tested object. Furthermore in detail, it is related with the fluorescent observation apparatus which has the characteristic in the irradiation part of the excitation light to a tested object.

【０００２】

[0002]

【従来の技術】

近年、生体組織の観察対象部位へ励起光を照射し、この励起光によって生体組織から直接発生する自家蛍光や生体へ注入しておいた薬物の蛍光を２次元画像として検出し、その蛍光像から生体組織の変性や癌等の疾患状態（例えば、疾患の種類や浸潤範囲）を診断する技術が用いられつつあり、例えば特開平８－２５２２１８号公報に示されるように、この蛍光観察を行うための蛍光観察装置が種々提案さ

[PRIOR ART]

In recent years, excitation light is irradiated to the site for observation of an organism tissue. It detects the fluorescence of the medicine injected into the organism and the self-fluorescence directly generated from an organism tissue by this excitation light as a two-dimensional image.

The technique that illness states (for example, the kind and permeation extent of the illness), such as the modified of an organism tissue and cancer, are diagnosed from the fluorescent image is used.

For example, as shown in the Provisional-

れている。

Publication-No. 8-252218 gazette, the various proposal of the fluorescent observation apparatus for performing this fluorescent observation is carried out.

【0003】
自家蛍光においては、生体組織に励起光を照射すると、その励起光より長い波長の蛍光が発生する。生体における蛍光物質としては、例えばコラーゲン，ＮＡＤＨ（ニコチンアミドアデニンヌクレオチド），ＦＭＮ（フラビンモノヌクレオチド），ビリジンヌクレオチド等がある。最近では、このような蛍光を発生する生体内因物質と疾患との相互関係が明確になりつつあり、これらの蛍光により癌等の診断が可能である。

[0003]
For self-fluorescence, if excitation light is irradiated to an organism tissue, fluorescence of a wavelength longer than the excitation light will occur.

It uses as the fluorescent material in the organism, for example, there are a collagen, NADH (nicotinamide adenine nucleotide) and FMN (flavin mononucleotide), ?biridine? nucleotide, etc.

Recently, the interactive relationship of ?factor-substance? in the living body and the illness which generate such a fluorescence is becoming clear, and the diagnosis of cancer etc. is possible by these fluorescence.

【0004】
また、薬物の蛍光においては、生体内へ注入する蛍光物質としては、ＨｐＤ（ヘマトポルフィリン），Photofrin，ＡＬＡ（δ－amino levulinic acid）等が用いられる。これらの薬物は癌などへの集積性があり、これを生体内に注入して蛍光を観察することで疾患部位を診断できる。また、モノクローナル抗体に蛍光物質を付加させ、抗原抗体反応により病変部に蛍光物質を集積させる方法もある。

[0004]
Moreover, in the fluorescence of a medicine, HpD (hematoporphyrin), Photofrin, ALA((delta)-amino levulinic acid), etc. are used as a fluorescent material injected into the living body.

These medicines have accumulation property, such as towards cancer.

An illness site can be diagnosed by injecting this in the living body and observing fluorescence.

Moreover, a fluorescent material is added to a monoclonal antibody, and there is also a method of making a disease part accumulate a fluorescent material by an antigen antibody

reaction.

【0005】
励起光としては例えばレーザ光，水銀ランプ，メタルハライドランプ等が用いられ、励起光を生体組織へ照射することによって観察対象部位の蛍光像を得る。この励起光による生体組織における微弱な蛍光を検出して2次元の蛍光画像を生成し、観察、診断を行う。

[0005]
It uses as excitation light, for example, a laser light, a mercury lamp, a metal halide lamp, etc. are used.

The fluorescent image of the site for observation is obtained by irradiating excitation light to an organism tissue, the slight fluorescence in the organism tissue by this excitation light is detected, and a two-dimensional fluorescent image is formed, and an observation and a diagnosis are performed.

【0006】

[0006]

【発明が解決しようとする課題】
しかしながら、特開平8－252218号公報等に示される従来の蛍光観察装置においては、生体の表面組織に励起光を照射し、生体の表面組織から発する自家蛍光を経内視鏡的に観察しているため、生体の表面に存在する病変部しか観察できず、生体の深部に存在する病変を観察できないという問題がある。

[PROBLEM ADDRESSED]
However, in the conventional fluorescent observation apparatus shown in the Provisional-Publication-No. 8-252218 gazette etc., excitation light is irradiated to the surface tissue of the organism.

Since the self-fluorescence emitted from the surface tissue of the organism is observed perendoscopically, there is a problem that only the disease part which exists on the surface of the organism can be observed, and the disease which exists in the deep part of the organism cannot be observed.

【0007】
本発明は、上記事情に鑑みてなされたものであり、生体の深部に存在する病変部を観察することのできる蛍光観察装置を提供

[0007]
This invention is made in view of the above-mentioned situation.

It aims at providing the fluorescent observation apparatus which can be observed

することを目的としている。

the disease part which exists in the deep part of the organism.

【0008】

[0008]

【課題を解決するための手段】本発明の蛍光観察装置は、生体組織に励起光を照射し、前記生体組織から発生する蛍光により前記生体組織を観察する蛍光観察装置において、生体深部組織に穿刺する針状シースと、前記針状シースの前記生体深部組織への穿刺状態を確認する超音波観察手段とを備え、前記針状シースの内部に前記励起光を伝送する照明用光ファイバと、前記生体組織から発生する蛍光を伝送する観察用光ファイバとを設けて構成される。

[SOLUTION OF THE INVENTION]
The fluorescent observation apparatus of this invention irradiates excitation light to an organism tissue.

In the fluorescent observation apparatus which observes the above-mentioned organism tissue according to the fluorescence generated from the above-mentioned organism tissue, it has the needle-like sheath which transfixes to an organism deep-part tissue, and ultrasonic observation means to confirm the transfixed state to the above-mentioned organism deep-part tissue of the above-mentioned needle-like sheath.

The optical fibre for illumination which transmits above-mentioned excitation light inside the above-mentioned needle-like sheath, and the optical fibre for observation which transmits the fluorescence generated from the above-mentioned organism tissue are provided.

【0009】本発明の蛍光観察装置では、前記針状シースを前記生体深部組織に穿刺し、前記超音波観察手段により前記針状シースの前記生体深部組織への穿刺状態を確認すると共に、前記照明用光ファイバにより前記生体組織に前記励起光を伝送し、前記観察用

[0009]
In the fluorescent observation apparatus of this invention, the above-mentioned needle-like sheath is transfixed to the above-mentioned organism deep-part tissue.
While confirming the transfix state to the above-mentioned organism deep-part tissue of the above-mentioned needle-like sheath by the above-mentioned ultrasonic observation

光ファイバにより前記生体組織から発生する蛍光を伝送することで、生体の深部に存在する病変部の観察を行うことを可能とする。

means, above-mentioned excitation light is transmitted to the above-mentioned organism tissue by the above-mentioned optical fibre for illumination.

It is enabled to observe the disease part which exists in the deep part of the organism, by transmitting the fluorescence generated from the above-mentioned organism tissue by the above-mentioned optical fibre for observation.

【００１０】

[0010]

【発明の実施の形態】

[Embodiment]

以下、図面を参照しながら本発明の実施の形態について述べる。

Hereafter, the embodiment of this invention is described, referring to drawings.

【００１１】

[0011]

（第１の実施の形態）図１ないし図３は本発明の第１の実施の形態に係わり、図１は蛍光観察装置の構成を示す構成図、図２は図１の光プローブを挿通する蛍光観察装置に用いられるコンベックス型超音波内視鏡の構成を示す構成図、図３は図２のコンベックス型超音波内視鏡により得られた超音波画像を表示するモニタを示す図である。

(First embodiment) Fig. 1 or 3 concerns the first embodiment of this invention.

Diagram 1 is a block diagram showing the composition of fluorescent observation apparatus. diagram 2 is a block diagram showing the composition of the convex type ultrasound endoscopy used for the fluorescent observation apparatus which passes through the optical probe in the diagram 1. diagram 3 is a diagram showing the monitor which displays the ultrasonic image obtained by the convex type ultrasound endoscopy in the diagram 2.

【００１２】

[0012]

（構成）図１に示すように、本実施の形態の蛍光観察装置１は、生体へ穿刺する先端部のみ

(Composition)

As shown in diagram 1, the fluorescent observation apparatus 1 of this embodiment is,

硬性で他は可撓性を有する針状のシース２から成る光プローブ３と、蛍光観察を行うための励起光を光プローブ３に供給する励起用光源４と、励起用光源４からの励起光の光プローブ３への供給を制御する制御装置５と、光プローブ３からの励起光による生体深部の病変部からの自家蛍光により組織を診断するスペクトロメータ６とを備えて構成される。

the optical probe 3 with which only the end which transfixes to the organism is hard, and the needle-like sheath 2 having flexibility, the light source for excitation 4 which supplies the excitation light for performing fluorescent observation to the optical probe 3, the control apparatus 5 which controls supply to the optical probe 3 of the excitation light from the light source for excitation 4, and the spectrometer 6 which diagnoses a tissue according to the self-fluorescence from the disease part of the organism deep part by the excitation light from the optical probe 3.

It has these and it is constituted.

【００１３】

光プローブ３の針状のシース２の内部には、第１チャンネル７及び第２チャンネル８が設けられ、第１チャンネル７にはスペクトロメータ６に接続され生体深部の病変部からの自家蛍光をスペクトロメータ６に伝送する第１の光ファイバ９が、また第２チャンネル８には励起用光源４に接続され励起用光源４からの励起光を伝送する第２の光ファイバ１０がそれぞれ配設されている。

[0013]

inside the needle-like sheath 2 of the optical probe 3, the 1st channel 7 and the second channel 8 are provided.

The first optical fibre 9 which is connected to the 1st channel 7 at a spectrometer 6, and transmits the self-fluorescence from the disease part of the organism deep part to a spectrometer 6, moreover the 2nd optical fibre 10 which is connected to the light source for excitation 4 in the second channel 8, and transmits the excitation light from the light source for excitation 4 are respectively arranged.

【００１４】

光プローブ３は、図２に示すように、先端部１１に設けられた体腔内の生体組織１２を光学観察する対物光学系１３に対して挿入方向前方に超音波振動子を

[0014]

The optical probe 3 should be shown in a diagram 2. In relation to the object optical system 13 which observes optically the organism tissue 12 intra-corporeal provided on the end 11, into the channel 16 of the convex

円弧状の凸状に配置した超音波送受信部１４を有するコンベックス型超音波内視鏡１５のチャンネル１６内に挿通されて用いられ、蛍光観察装置１においては、コンベックス型超音波内視鏡１５は、図示はしないが、観察用照明光を供給する観察用光源及び超音波送受信部１４により超音波を送受し超音波画像を生成する超音波観測装置に接続され、例えば体腔内の生体組織１２の光学像を接眼部で観察しながら超音波観測装置からの超音波画像を、図３に示すような外部モニタ１７に表示することで、光プローブ３の生体組織１２への穿刺状態を確認可能な構成となっている。

type ultrasound endoscopy 15 which has an ultrasonic vibrator the circular ultrasonic transmitting-and-receiving part 14 configured convex-shaped in the insertion direction passes through and it is used.

In the fluorescent observation apparatus 1, the convex type ultrasound endoscopy 15 is not illustrated.
However, it connects with the ultrasonic observation apparatus which sends and receives an ultrasonic wave by the light source for observation and the ultrasonic transmitting-and-receiving part 14 which supply the illumination light for observation, and forms an ultrasonic image.

For example, by displaying on the external monitor 17 which shows the ultrasonic image from an ultrasonic observation apparatus in a diagram 3, observing the optical image of the organism tissue 12 intra-corporeal in an eye-piece part, it is the composition which can confirm the transfix state to the organism tissue 12 of the optical probe 3.

【００１５】
（作用）次に、このように構成された本実施の形態の蛍光観察装置１の作用について説明する。

[0015]
(Effect)

Next, an effect of the fluorescent observation apparatus 1 of this embodiment constituted in this way is demonstrated.

【００１６】
蛍光観察装置１の光プローブ３は、コンベックス型超音波内視鏡１５のチャンネル１６を介して生体組織１２に穿刺される。この時、コンベックス型超音波

[0016]
The transfix of the optical probe 3 of the fluorescent observation apparatus 1 is carried out to the organism tissue 12 via the channel 16 of the convex type ultrasound endoscopy 15.
At this time, the ultrasonic image of the deep

内視鏡１５に接続された外部モニタ１７には、生体組織１２の深部の超音波画像が表示され、術者は生体組織１２の深部の病変部１８（図３参照）に確実に光プローブ３が穿刺していることを確認しながら、光プローブ３を誘導する。

part of the organism tissue 12 is displayed on the external monitor 17 connected to the convex type ultrasound endoscopy 15.

An operator guides the optical probe 3, confirming that the optical probe 3 is carrying out the transfix to the disease part 18 (diagram 3 reference) of the deep part of the organism tissue 12 reliably.

【００１７】

そして、術者は生体組織１２の深部の目的とする病変部１８に光プローブ３が確実に穿刺したことを確認したら、外部に設けた制御装置５を操作し、励起用光源４から病変部１８に励起光を供給し、この励起光は、第２の光ファイバ１０を介して生体組織１２の深部の病変部１８に照射される。

[0017]

And, if the operator checks that the optical probe 3 has transfixed reliably to the disease part 18 objective of the deep part of the organism tissue 12, the control apparatus 5 provided externally will be operated.

Excitation light is supplied to the disease part 18 from the light source for excitation 4.

These excitation light is irradiated by the disease part 18 of the deep part of the organism tissue 12 via the 2nd optical fibre 10.

【００１８】

励起光が照射されると、生体組織１２の深部の病変部１８からは自家蛍光が放射され、自家蛍光は第１の光ファイバ９を介して外部に設けられたスペクトロメータ６に導かれる。そして、術者はスペクトロメータ６を読み取ることで、生体組織１２の深部の病変部１８の蛍光観察を行う。

[0018]

Irradiation of excitation light radiates a self-fluorescence from the disease part 18 of the deep part of the organism tissue 12, and a self-fluorescence is guided to the spectrometer 6 externally provided via the first optical fibre 9.

And, an operator is reading a spectrometer 6 and performs fluorescent observation of the disease part 18 of the deep part of the organism tissue 12.

【００１９】

（効果）このように本実施の形態の蛍光観察装置１では、生体

[0019]

(Effect)

Not only for the surface part of the organism

組織１２の深部の病変部１８に針状の光プローブ３を穿刺することで、生体組織１２の表面部のみならず、生体組織１２の深部の病変部１８の蛍光観察が可能となる。また、光プローブ３の生体組織１２の深部への穿刺状態をコンベックス型超音波内視鏡１５で観察しているため、術者は確実に病変部１８へ穿刺することができる。

tissue 12 in transfixing the needle-like optical probe 3 to the disease part 18 of the deep part of the organism tissue 12 with the fluorescent observation apparatus 1 of this embodiment in this way, also the fluorescent observation of the disease part 18 of the deep part of the organism tissue 12 can be performed.

Moreover, since the transfix state to the deep part of the organism tissue 12 of the optical probe 3 is observed by the convex type ultrasound endoscopy 15, an operator can reliably transfix to the disease part 18.

【００２０】

なお、本実施の形態では、コンベックス型超音波内視鏡１５により、光プローブ３の穿刺状態を確認しているが、これに限らず、ラジアル型あるいはリニア型の超音波内視鏡で光プローブ３の穿刺状態の確認を行い、生体組織１２の深部の病変部１８の蛍光観察するようにしてもよい。

[0020]

In addition, in this embodiment, the transfix state of the optical probe 3 is confirmed by the convex type ultrasound endoscopy 15.

However, it does not restrict to this, and the transfix state of the optical probe 3 is confirmed by a radial type or a linear type of ultrasound endoscopy.

The disease part 18 of the deep part of the organism tissue 12 may be observed fluorescently.

【００２１】

（第２の実施の形態）図４は本発明の第２の実施の形態に係る蛍光観察装置の構成を示す構成図である。

[0021]

(2nd embodiment) diagram 4 is a block diagram showing the composition of the fluorescent observation apparatus based on the 2nd embodiment of this invention.

【００２２】

第２の実施の形態は、第１の実施の形態とほとんど同じであるので、異なる点のみ説明し、同一の構成には同じ符号をつけ説

[0022]

Since the 2nd embodiment is almost the same as that of a first embodiment, it demonstrates only the different items.

The same code for identical composition is

明は省略する。

attached and description is omitted.

【００２３】
（構成）図４に示すように、本実施の形態の蛍光観察装置１ａにおいては、光プローブ３の針状シース２の内部に、第１チャンネル７及び第２チャンネル８の他に第３チャンネル２１が設けられ、この第３チャンネル２１は蛍光診断を行うための薬剤２２及び治療用の薬剤２３が注入可能に外部に設けたシリンジ２４、２５に接続されており、バルブ２６を制御することにより、各々を選択的に第３チャンネル２１に供給できるようになっている。

[0023]
(Composition)
As shown in a diagram 4, in fluorescent observation apparatus 1a of this embodiment, the 1st channel 7 and the 3rd channel 21 other than the second channel 8 are provided on the inside of the needle-like sheath 2 of the optical probe 3.

As for this 3rd channel 21, the chemical agent 22 for performing fluorescent diagnosis and the chemical agent 23 for treatments are in the syringes 24 and 25 connected externally for possible injection.

By controlling a valve 26, each can be selectively supplied now to the 3rd channel 21.

【００２４】
また、本実施の形態の蛍光観察装置１ａは、治療用光源２７を備えており、制御装置５により第２チャンネル８に設けられた第２の光ファイバ１０に励起用光源４からの励起光と治療用光源２７からの光を選択して照射・供給することができるようになっている。

[0024]
Moreover, fluorescent observation apparatus 1a of this embodiment has the light source for treatments 27.

The excitation light from the light source for excitation 4 and the light from the light source for treatments 27 are chosen as the 2nd optical fibre 10 provided on the second channel 8 with the control apparatus 5, it can irradiate or supply now.

【００２５】
なお、蛍光診断用の薬剤２２としては、例えばヘマトポルフィリン（ＨＰＤ）等が用いられ、治療用の薬剤２３としては、ルミン等が用いられる。

[0025]
In addition, it is considered as the chemical agent 22 for fluorescent diagnosis, for example, hematoporphyrin (HPD) etc. is used.

?lumine? etc. is used as a chemical agent 23 for treatments.

【００２６】
その他の構成は第１の実施の形態と同じである。

[0026]
Other composition is the same as that of the first embodiment.

【００２７】
（作用）このように構成された本実施の形態の蛍光観察装置１ａの光プローブ３は、第１実施の形態と同じく、コンベックス型超音波内視鏡１５のチャンネル１６を介して生体組織１２の深部に挿入される（図２参照）。そして、コンベックス型超音波内視鏡１５からの超音波画像を外部モニタ１７により観察しながら生体組織１２の深部の病変部１８へ光プローブ３が誘導される。

[0027]
(Effect)
Thus the optical probe 3 of fluorescent observation apparatus 1a of this constituted embodiment is similarly inserted in the deep part of the organism tissue 12 via the channel 16 of the convex type ultrasound endoscopy 15, as in the 1st embodiment (diagram 2 reference).
And, the optical probe 3 is guided to the disease part 18 of the deep part of the organism tissue 12, observing the ultrasonic image from the convex type ultrasound endoscopy 15 with the external monitor 17.

【００２８】
術者が生体組織１２の深部の病変部１８に光プローブ３が穿刺されたことを確認すると、バルブ２６を制御し、シリンジ２４から蛍光診断用の薬剤２２を第３チャンネル２１を介して病変部１８に注入する。次に、制御装置５により診断用の励起用光源４から診断用の励起光を第２の光ファイバ１０を介して生体組織１２の深部の病変部１８に照射する。

[0028]
An operator's confirmation of that the optical probe 3 transfixed the disease part 18 of the deep part of the organism tissue 12 controls a valve 26.
The chemical agent 22 for fluorescent diagnosis is injected into the disease part 18 via the 3rd channel 21 from a syringe 24.
Next, the excitation light for a diagnosis are irradiated among the disease part 18 of the deep part of the organism tissue 12 via the 2nd optical fibre 10 from the light source for excitation 4 for a diagnosis with a control apparatus 5.

【００２９】

[0029]

すると、蛍光診断用の薬剤２２が病変部１８に注入されているため、病変部１８からは蛍光が放射される。この蛍光は第１チャンネル７に設けられた第１の光ファイバ９を介して外部に設けられたスペクトロメータ６に導かれる。そして、術者がスペクトロメータ６を観察することで、病変部１８の蛍光診断が可能となる。

Then, since the chemical agent 22 for fluorescent diagnosis is injected into the disease part 18, a fluorescence is radiated from the disease part 18.

This fluorescence is guided to the spectrometer 6 externally provided via the first optical fibre 9 provided on the 1st channel 7.

And, fluorescent diagnosis of the disease part 18 is made by an operator observing a spectrometer 6.

【００３０】

生体組織１２の深部の病変部１８の観察が終わった後、次に、外部に設けられたシリンジ２５から治療用の薬剤２３を第３チャンネル２１を介して生体組織１２の深部の病変部１８に注入する。そして、外部に設けられた治療用光源２７から治療用の光を制御装置５を介して第２の光ファイバ１０へ導く。

[0030]

After an observation of the disease part 18 of the deep part of the organism tissue 12 finishes, next, the chemical agent 23 for treatments is injected into the disease part 18 of the deep part of the organism tissue 12 via the 3rd channel 21 from the syringe 25 provided externally.

And, the light for treatments is guided to the 2nd optical fibre 10 via a control apparatus 5 from the light source for treatments 27 provided externally.

【００３１】

すると、光プローブ３からは治療用の光が放射され、治療用薬剤２３と化学反応を起こし、生体組織１２の深部の病変部１８の治療が行われる。

[0031]

Then, the light for treatments is radiated from the optical probe 3, the chemical agent for treatments 23 undergoes chemical reaction, and the treatment of the disease part 18 of the deep part of the organism tissue 12 is performed.

【００３２】

（効果）このように本実施の形態の蛍光観察装置１ａでは、第

[0032]

(Effect)

Thus in addition to the effect of a first

１の実施の形態の効果に加え、生体組織１２の深部の病変部１８治療も可能となる。

embodiment, in fluorescent observation apparatus 1a of this embodiment, disease part 18 treatment of the deep part of the organism tissue 12 is also made.

【００３３】
（第３の実施の形態）図５は本発明の第３の実施の形態に係る蛍光観察装置の構成を示す構成図である。

[0033]
(Third embodiment) diagram 5 is a block diagram showing the composition of the fluorescent observation apparatus based on the third embodiment of this invention.

【００３４】
第３の実施の形態は、第１の実施の形態とほとんど同じであるので、異なる点のみ説明し、同一の構成には同じ符号をつけ説明は省略する。

[0034]
Since the third embodiment is almost the same as that of the first embodiment, it demonstrates only the different items, and the same code for identical composition is attached and description is omitted.

【００３５】
（構成）図５に示すように、本実施の形態の蛍光観察装置１ｂにおいては、光プローブ３の針状シース２の内部に、第１チャンネル７及び第２チャンネル８の他に第３チャンネル３１が設けられ、この第３チャンネル３１は治療用の薬剤３２が注入可能に外部に設けたシリンジ３３に接続されている。

[0035]
(Composition)
As shown in a diagram 5, in fluorescent observation apparatus 1b of this embodiment, the 1st channel 7 and the 3rd channel 31 other than the second channel 8 are provided on the inside of the needle-like sheath 2 of the optical probe 3.

This 3rd channel 31 is connected to the syringe 33 which provided the chemical agent 32 for treatments connected externally for possible injection.

【００３６】
また、本実施の形態の蛍光観察装置１ｂでは、第１チャンネル７に設けられた第１の光ファイバ９を伝送した生体組織１２の

[0036]
Moreover, the self-fluorescence from the disease part 18 of the deep part of the organism tissue 12 which transmitted the first optical fibre 9 provided on the 1st channel 7 in fluorescent

深部の病変部１８からの自家蛍光は、イメージインテンシファイヤを内蔵する高感度カメラ３４で撮像され、画像処理装置３５により信号処理され、モニタ３６にて術者が病変部１８の蛍光画像を観察可能な構成となっている。

observation apparatus 1b of this embodiment is recorded with the high-sensitivity camera 34 which contains an image intensifier, signal processing is carried out by the image processing device 35, and with a monitor 36, it is the composition whereby the fluorescent image of the disease part 18 can be observed by the operator.

【００３７】
ここで、制御装置５により供給が制御される励起用光源４は、例えばヘリウム、カドミウムレーザが用いられ、励起光の波長は４４２ｎｍである。また、治療用の薬剤３２としては、酸化チタン（ＴｉＯ２）が用いられる。

[0037]
Here, as for the light source for excitation 4 with which supply is controlled by the control apparatus 5, helium and a cadmium laser are used, for example, and the wavelength of excitation light is 442 nm.

Moreover, titanium-oxide (TiO2) is used as a chemical agent 32 for treatments.

【００３８】
その他の構成は第１の実施の形態と同じである。

[0038]
Other composition is the same as that of the first embodiment.

【００３９】
（作用）このように構成された本実施の形態の蛍光観察装置１ｂの光プローブ３は、第１実施の形態と同じく、コンベックス型超音波内視鏡１５のチャンネル１６を介して生体組織１２の深部に挿入される（図２参照）。そして、コンベックス型超音波内視鏡１５からの超音波画像を外部モニタ１７により観察しながら生体組織１２の深部の病変部１８へ光プローブ３が誘導さ

[0039]
(Effect)

Thus the optical probe 3 of fluorescent observation apparatus 1b of this constituted embodiment is similarly inserted in the deep part of the organism tissue 12 via the channel 16 of the convex type ultrasound endoscopy 15 with the 1st embodiment (diagram 2 reference).

And, the optical probe 3 is guided to the disease part 18 of the deep part of the organism tissue 12, observing the ultrasonic image from the convex type ultrasound endoscopy 15 with the external monitor 17.

れる。

【００４０】
そして、術者は外部モニタ１７で光プローブ３の生体組織１２の深部の病変部１８への穿刺を確認し、生体組織１２の深部の病変部１８へ穿刺したことが確認できたら、外部に設けられた励起用光源４から４４２ｎｍの蛍光観察用の励起光を供給する。

【００４１】
この励起光は、第２の光ファイバ１０を介して生体組織１２の深部の病変部１８に照射される。４４２ｎｍの励起光が照射されると、生体組織１２の深部からは自家蛍光が放射される。この自家蛍光は第１の光ファイバ９を介して外部に設けられた高感度カメラ３４で捉えられ、画像処理装置３５で処理され、外部に設けられたモニタ３６に病変部１８が蛍光画像として表示される。

【００４２】
術者はモニタ３６で病変部１８が確認できたら、次に外部に設けられた治療用の薬剤３２としての酸化チタン（ＴｉＯ２）を第３チャンネル３１を介して生体組織１２の深部の病変部１８に注入を行う。そして、外部に

[0040]
And, an operator confirms the transfix to the disease part 18 of the deep part of the organism tissue 12 of the optical probe 3 with the external monitor 17.

If it is verified having transfixed to the disease part 18 of the deep part of the organism tissue 12, the 442 nm excitation light for fluorescent observation will be supplied from the light source for excitation 4 provided externally.

[0041]
These excitation light is irradiated by the disease part 18 of the deep part of the organism tissue 12 via the 2nd optical fibre 10.

If 442 nm excitation light is irradiated, a self-fluorescence is radiated from the deep part of the organism tissue 12.

This self-fluorescence is caught with the high-sensitivity camera 34 externally provided via the first optical fibre 9, it is processed by the image processing device 35, and the disease part 18 is displayed as a fluorescent image by the monitor 36 provided externally.

[0042]
An operator will inject titanium-oxide (TiO2) as a chemical agent 32 for treatments next, provided externally, into the disease part 18 of the deep part of the organism tissue 12 via the 3rd channel 31, if the disease part 18 can be confirmed with a monitor 36.

And, a 442 nm light is irradiated to the

設けられたヘリウム、カドミウムレーザからなる励起用光源４から４４２ｎｍの光を第２の光ファイバ１０を介して生体組織１２の深部の病変部１８に照射する。生体組織１２の深部には治療用薬剤３６の酸化チタン（ＴｉＯ２）が注入されているため、励起光源４から放射された４４２ｎｍの光と酸化還元反応を起こし、生体組織１２の深部の病変部１８は治療されることとなる。

disease part 18 of the deep part of the organism tissue 12 via the 2nd optical fibre 10 from the light source for excitation 4 which consists of helium, cadmium laser provided externally.

Since titanium-oxide (TiO2) of the chemical agent for treatments 36 is injected into the deep part of the organism tissue 12, the 442 nm light and the oxidation reduction reaction which were radiated from the excitation source 4 are generated.

The treatment of the disease part 18 of the deep part of the organism tissue 12 will be carried out.

【００４３】

（効果）このように本実施の形態の蛍光観察装置１ｂでは、第２の実施の形態と同様に、第１の実施の形態の効果に加え、生体組織１２の深部の病変部１８治療も可能となる。また、第２の実施の形態と比べ、治療用光源、診断用光源が１つの光源で共用でき、システムの小型化が図れる。さらに、生体組織１２の深部の情報を画像として表示しているため、診断能が向上する。

[0043]

(Effect)

Thus in fluorescent observation apparatus 1b of this embodiment, it adds to the effect of the first embodiment like the 2nd embodiment, and disease part 18 treatment of the deep part of the organism tissue 12 is also made.

Moreover, compared with a 2nd embodiment, the light source for treatments and the light source for a diagnosis can use shared one light source, and a size-reduction of the system can be attained.

Furthermore, since it is displayed, using information on the deep part of the organism tissue 12 as an image, diagnostic ability improves.

【００４４】

（第４の実施の形態）図６は本発明の第４の実施の形態に係る蛍光観察装置の構成を示す構成図である。

[0044]

(The 4th embodiment) diagram 6 is a block diagram showing the composition of the fluorescent observation apparatus based on the 4th embodiment of this invention.

【００４５】
（構成）図６に示すように、本実施の形態の蛍光観察装置５１は、被検体の体腔内に挿入する挿入部５２の先端部内にＭＲアンテナ５３を有する内視鏡５４と、内視鏡５４に蛍光観察用の励起光を供給する光源部５６ａとＭＲアンテナ５３からのＭＲ信号を増幅するアンプ５５とを備えた光源５６と、蛍光観察用の励起光により励起された生体組織からの自家蛍光を撮像するイメージインテンシファイヤを内蔵した高感度カメラ５７と、被検体を静磁場内に置きＭＲアンテナ５３より高周波磁場を出力すると共にアンプ５５により増幅されたＭＲアンテナ５３からのＭＲ信号によりＭＲ画像を生成するＭＲ画像処理装置５８と、高感度カメラ５７により撮像された撮像信号により蛍光画像を生成する蛍光画像処理装置５９とを備え、ＭＲ画像処理装置５８及び蛍光画像処理装置５９により生成されたＭＲ画像及び蛍光画像をモニタ６０に表示するようになっている。

[0045]
(Composition)
As shown in a diagram 6, the fluorescent observation apparatus 51 of this embodiment is, the endoscope 54 which has the MR antennae 53 in the end of the insertion part 52 inserted in the intra-corporeal of the subject, the light source 56 equipped with light-source part 56a which supplies the excitation light for fluorescent observation to an endoscope 54, and the amp 55 which amplifies MR signal from the MR antennae 53, the high-sensitivity camera 57 which contained the image intensifier which records the self-fluorescence from the organism tissue excited by the excitation light for fluorescent observation, the MR image processing device 58 which forms MR image with MR signal from the MR antennae 53 amplified with the amp 55 while the subject was placed into the static magnetic field and the high-frequency magnetic field was output from the MR antennae 53, and the fluorescent image processing device 59 which forms a fluorescent image with the image-pick-up signal recorded with the high-sensitivity camera 57.

It has these.

MR image formed by the MR image processing device 58 and the fluorescent image processing device 59 and a fluorescent image are displayed in the monitor 60.

【００４６】
内視鏡５４は、挿入部５２の基端に設けられた把持部６１より

[0046]
For endoscope 54, from holding part 61 provided on the base end of an insertion part

ユニバーサルケーブル６２が光源５６に着脱自在に延出しており、光源５６からの蛍光観察用の励起光がユニバーサルケーブル６２及び挿入部５２内に挿通されたライトガイド６３を伝送し内視鏡５４の先端より生体組織に照射されるようになっている。

52, the universal cable 62 is extending detachably to light source 56.

The excitation light for the fluorescent observation from a light source 56 transmit the light guide 63 passed through in the universal cable 62 and the insertion part 52, and irradiate from the end of an endoscope 54 to an organism tissue.

【００４７】

また、ユニバーサルケーブル６２及び挿入部５２内にはＭＲアンテナ５３に接続された信号線６４が配設されており、この信号線６４によりＭＲアンテナ５３からの検出信号が光源５６内のアンプに伝送されるようになっている。

[0047]

Moreover, in the universal cable 62 and the insertion part 52, the signal line 64 connected to the MR antennae 53 is arranged.

The detecting signal from the MR antennae 53 transmits to the amp via light source 56 by this signal line 64.

【００４８】

さらに、挿入部５２及び把持部６１内にはイメージガイド６５が設けられており、蛍光観察用の励起光により励起された生体組織からの自家蛍光を高感度カメラ５７が着脱自在に接続される接眼部６６に伝送するようになっている。

[0048]

Furthermore, the image guide 65 is provided in the insertion part 52 and the holding part 61.

The high-sensitivity camera 57 transmits the self-fluorescence from the organism tissue excited by the excitation light for fluorescent observation to the eye-piece part 66 connected detachably.

【００４９】

（作用）次に、このように構成された本実施の形態の蛍光観察装置５１の作用について説明する。

[0049]

(Effect)

Next, an effect of the fluorescent observation apparatus 51 of this embodiment constituted in this way is demonstrated.

【００５０】
被検体を静磁場内に置き、体腔内に内視鏡５４の挿入部５２を挿入する。そして、光源５６から蛍光観察用の励起光を出射し、ライトガイド６３を介して内視鏡５４の先端から励起光を生体組織に照射する。生体組織に励起光が照射されると生体組織からは自家蛍光が放出され、この自家蛍光はイメージガイド６５を介して高感度カメラ５７に送られる。そして、外部の蛍光画像処理装置５９で画像処理され、モニタ６０に蛍光画像が表示される。

[0050]
A subject is placed into a static magnetic field, and the insertion part 52 of an endoscope 54 is inserted intra-corporeal.
And, the radiation of the excitation light for fluorescent observation is carried out from a light source 56.
Excitation light is irradiated from the end of an endoscope 54 to an organism tissue via a light guide 63.
An organism tissue's irradiation of excitation light carries out the release of the self-fluorescence from an organism tissue.
This self-fluorescence is sent to the high-sensitivity camera 57 via the image guide 65, image processing is carried out by the external fluorescent image processing device 59, and a fluorescent image is displayed by the monitor 60.

【００５１】
また、内視鏡５４に内蔵されたＭＲアンテナ５３にＭＲ画像処理装置５８より所定の周波数の高周波信号を送出し、ＭＲアンテナ５３から被検体に高周波磁場を出力する。なお、この高周波磁場の方向は静磁場の方向と直交していることが望ましい。そして、被検体からのＭＲ信号をＭＲアンテナ５３で受信しアンプ５５で増幅され、蛍光観察している病変部の深さ方向の情報が捉えられる。このＭＲ信号がＭＲ画像処理部５８に導かれ、モニタ６０にＭＲ画像とし

[0051]
Moreover, from the MR antennae 53 built-in in the endoscope 54 the MR image processing device 58, the high-frequency signal of a predetermined frequency is sent, and a high-frequency magnetic field is output to the subject from the MR antennae 53.
In addition, as for the direction of this high-frequency magnetic field, it is desirable to cross orthogonally with the direction of the static magnetic field.
And, the MR antennae 53 receive MR signal from a subject, and it is amplified with an amp 55.
Data in the depth direction of the fluorescent disease part currently observed is caught, this

て表示される。

MR signal is guided to MR image-processing part 58, and monitor 60 displays it as a MR image.

【００５２】
この結果、術者は、モニタ６０に表示された蛍光画像及びＭＲ画像により生体の表面、及び深部方向の観察を行う。

[0052]
Consequently, an operator performs an observation of the surface of the organism, and in the depth direction by the fluorescent image and MR image which were displayed by the monitor 60.

【００５３】
（効果）このように本実施の形態の蛍光観察装置５１は、病変部の表面の情報が蛍光画像として観察でき、また、病変部の深さ方向の情報がＭＲ画像として観察できるため、生体の表面情報のみならず、深部情報の観察も可能となり、診断能が向上する。

[0053]
(Effect)
Thus information on the surface of a disease part can be observed the fluorescent observation apparatus 51 of this embodiment as a fluorescent image.
Moreover, since information in the depth direction of the disease part can be observed as a MR image, not only surface information on the organism but an observation of deep-part information is attained, and diagnostic ability improves.

【００５４】
（第５の実施の形態）図７及び図８は本発明の第５の実施の形態に係わり、図７は蛍光観察装置の光プローブの構成を示す構成図、図８は図７の光プローブをチャンネルに挿通した内視鏡の構成を示す構成図である。

[0054]
(The 5th embodiment) Fig. 7 and 8 is involved in the 5th embodiment of this invention.
Diagram 7 is a block diagram showing the composition of the optical probe of fluorescent observation apparatus. diagram 8 is a block diagram showing the composition of the endoscope which passed through the optical probe of diagram 7 to the channel.

【００５５】

[0055]

第５の実施の形態は、第４の実施の形態とほとんど同じであるので、異なる点のみ説明し、同一の構成には同じ符号をつけ説明は省略する。

Since the 5th embodiment is almost the same as that of the 4th embodiment, it demonstrates only the different items.

The same code for identical composition is attached and description is omitted.

【００５６】

第４の実施の形態では、先端部内にＭＲアンテナを設けた内視鏡を用いて構成したが、本実施の形態では、通常の内視鏡のチャンネルにＭＲアンテナを有する光プローブを挿入して蛍光観察装置を構成する。

[0056]

It is constituted from the 4th embodiment using the endoscope which provided MR antennae in the end part.

However, the optical probe which has MR antennae is inserted in the channel of a usual endoscope, and fluorescent observation apparatus consists of this embodiment.

【００５７】

すなわち、図７に示すように、本実施の形態における光プローブ７１は、その内腔に生体組織からの蛍光画像を伝送するイメージガイド７２を内蔵しており、生体の深部情報を観察するためにイメージガイド７２の外周に第１のＭＲアンテナ７３が、また挿入軸方向に沿って第２のＭＲアンテナ７４がそれぞれ設けられている。

[0057]

That is, as shown in a diagram 7, the optical probe 71 in this embodiment contains the image guide 72 which transmits the fluorescent image from an organism tissue to the lumina.

In order to observe deep-part information on the organism, the first MR antennae 73 is on the periphery of the image guide 72, moreover in the insertion axial direction, the 2nd MR antennae 74 is respectively provided.

【００５８】

そして、図８に示すように、体腔内に挿入される内視鏡８１のチャンネル８２内に光プローブ７１を挿通させて先端より突出させることで、蛍光画像とＭＲ画像を得るようになっている。

[0058]

And, as shown in a diagram 8, a fluorescent image and MR image are obtained by making the optical probe 71 pass through and making it project from an end in the channel 82 of the endoscope 81 inserted intra-corporeal.

【００５９】
なお、図示はしないが、第４の実施の形態と同様に、内視鏡８１のライトガイド８３には光源５６からの蛍光観察用の励起光が供給され、光プローブ７１のイメージガイド７２を伝送する生体組織からの蛍光を高感度カメラ５７が撮像し蛍光画像処理装置５９で処理し、さらに第１のＭＲアンテナ７３及び第２のＭＲアンテナ７３からのＭＲ信号をＭＲ画像処理装置５８で処理することで、ＭＲ画像処理装置５８及び蛍光画像処理装置５９により生成されたＭＲ画像及び蛍光画像をモニタ６０に表示するようになっている（図６参照）。

[0059]
In addition, it is not illustrated, however, the excitation light for the fluorescent observation from a light source 56 are supplied to the light guide 83 of an endoscope 81 like the 4th embodiment.
The high-sensitivity camera 57 records the fluorescence from the organism tissue which transmits the image guide 72 of the optical probe 71, and it is processed by the fluorescent image processing device 59.
Furthermore by processing MR signal from the first MR antennae 73 and the 2nd MR antennae 73 by the MR image processing device 58, MR image formed by the MR image processing device 58 and the fluorescent image processing device 59 and a fluorescent image are displayed on monitor 60 (diagram 6 reference).

【００６０】
（作用）このように構成した本実施の形態の蛍光観察装置は、被検体を静磁場内に置き、目的とする生体内腔に内視鏡８１を挿入する。次に、内視鏡８１のチャンネル８２内に光プローブ７１を挿入する。

[0060]
(Effect)
Thus the fluorescent observation apparatus of this constituted embodiment puts the subject into a static magnetic field, an endoscope 81 is inserted in a target cavity in the living body, and next, the optical probe 71 is inserted into the channel 82 of an endoscope 81.

【００６１】
そして、内視鏡８１のライトガイド８３から、光源５６からの蛍光観察用の励起光を生体組織に照射する。この励起光の生体組織への照射により、生体組織からは自家蛍光が放出される。

[0061]
And from light guide 83 of endoscope 81 , the excitation light for the fluorescent observation from a light source 56 are irradiated to an organism tissue.
The release of the self-fluorescence occurs from the organism tissue by the irradiation to

the organism tissue of this excitation light.

【００６２】
この自家蛍光は、光プローブ７１内に設けたイメージガイド７２を介して高感度カメラ５７により撮像され蛍光画像処理装置５９に導かれ、モニタ６０に蛍光画像が表示される。

[0062]
This self-fluorescence is recorded with the high-sensitivity camera 57 via the image guide 72 provided in the optical probe 71, and is guided to the fluorescent image processing device 59, and a fluorescent image is displayed by monitor 60.

【００６３】
また、光プローブ７１に設けた第１のＭＲアンテナ７３、第２のＭＲアンテナ７４により得られたＭＲ信号をＭＲ画像処理装置５８により処理することで、３次元のＭＲ画像がモニタ６０に同じく表示される。

[0063]
Moreover, three-dimensional MR image is similarly displayed by the monitor 60 by processing MR signal obtained with the first MR antennae 73 provided on the optical probe 71, and the 2nd MR antennae 74 by the MR image processing device 58.

【００６４】
（効果）このように本実施の形態の蛍光観察装置は、第４実施の形態と比較し、光プローブ７１を内視鏡８１のチャンネル８２内に挿入し、蛍光観察を行うため、既存の内視鏡８１を流用することが可能である。さらに光プローブ７１を使っているため、自由度が大きく任意の位置の病変部が観察可能である。また、ＭＲアンテナを２つ設けてあるため、３次元で生体深部方向の観察可能となる。

[0064]
(Effect)
Thus the fluorescent observation apparatus of this embodiment is compared with the 4th embodiment.
The optical probe 71 is inserted into the channel 82 of an endoscope 81.

Since fluorescent observation is performed, it is possible to divert use of the existing endoscope 81.

Furthermore since the optical probe 71 is used, freedom is extensive, and the disease part at arbitrary positions is observeable.

Moreover, since two MR antennae are provided, three-dimensionally in the direction of the organism deep part it can be observed.

【0065】
（第６の実施の形態）図９ないし図１１は本発明の第６の実施の形態に係わり、図９は蛍光観察装置の光プローブをチャンネルに挿通した内視鏡の構成を示す構成図、図１０は図９の光プローブをチャンネルに挿通した内視鏡の第１の変形例の構成を示す構成図、図１１は図９の光プローブをチャンネルに挿通した内視鏡の第２の変形例の構成を示す構成図である。

[0065]
(The 6th embodiment) Fig. 9 or 11 is involved in the 6th embodiment of this invention.
Diagram 9 is a block diagram showing the composition of the endoscope which passed through the optical probe of fluorescent observation apparatus to the channel.
Diagram 10 is a block diagram showing the composition of the first modification of the endoscope which passed through the optical probe in the diagram 9 to the channel.
Diagram 11 is a block diagram showing the composition of the 2nd modification of the endoscope which passed through the optical probe in the diagram 9 to the channel.

【0066】
第６の実施の形態は、第４の実施の形態とほとんど同じであるので、異なる点のみ説明し、同一の構成には同じ符号をつけ説明は省略する。

[0066]
Since the 6th embodiment is almost the same as that of the 4th embodiment, it demonstrates only the different items, the same code for identical composition is attached and description is omitted.

【0067】
（構成）第４の実施の形態では、先端部内にＭＲアンテナを設けた内視鏡を用いて構成したが、本実施の形態では、図９に示すように、第１チャンネル９１及び第２チャンネル９２を有する内視鏡９３を用い、生体組織からの蛍光画像を伝送するイメージガイド９４を有する光プローブ９５を第１チャンネル９１に挿通し、ＭＲアンテナ９６を有

[0067]
(Composition)
It constituted from the 4th embodiment using the endoscope which provided MR antennae to end part.
However, in this embodiment, as shown in a diagram 9, the endoscope 93 which has the 1st channel 91 and the second channel 92 is used. The optical probe 95 which has the image guide 94 which transmits the fluorescent image from an organism tissue is passed through to the 1st channel 91, and a fluorescent observation

するMRプローブ９７を第２チャンネル９２に挿通することで蛍光観察装置を構成する。

apparatus consists of passing through the MR probe 97 which has the MR antennae 96, to the second channel 92.

【００６８】

なお、図示はしないが、第４の実施の形態と同様に、内視鏡９３のライトガイド９８には光源５６からの蛍光観察用の励起光が供給され、光プローブ９５のイメージガイド９４を伝送する生体組織からの蛍光を高感度カメラ５７が撮像し蛍光画像処理装置５９で処理し、さらにMRアンテナ９６からのMR信号をMR画像処理装置５８で処理することで、MR画像処理装置５８及び蛍光画像処理装置５９により生成されたMR画像及び蛍光画像をモニタ６０に表示するようになっている（図６参照）。

[0068]

In addition, while it is not illustrated, the excitation light for the fluorescent observation from a light source 56 is supplied to the light guide 98 of an endoscope 93 like in the 4th embodiment.

The high-sensitivity camera 57 records the fluorescence from the organism tissue which transmits the image guide 94 of the optical probe 95, and it is processed by the fluorescent image processing device 59.

Furthermore by processing MR signal from the MR antennae 96 by the MR image processing device 58, MR image formed by the MR image processing device 58 and the fluorescent image processing device 59 and a fluorescent image are displayed in the monitor 60 (diagram 6 reference).

【００６９】

（作用）このように構成した本実施の形態の蛍光観察装置は、被検体を静磁場内に置き、目的とする生体内腔に内視鏡９３を挿入する。次に、内視鏡９３の第１チャンネル９１内に光プローブ９５を挿入し、第２チャンネル９２内にMRプローブ９７を挿入する。

[0069]

(Effect)

Thus the fluorescent observation apparatus of this constituted embodiment puts the subject into a static magnetic field, an endoscope 93 is inserted in the target cavity in the living body, next, the optical probe 95 is inserted into 1st channel 91 of an endoscope 93, and the MR probe 97 is inserted into the second channel 92.

【００７０】

そして、内視鏡９３のライトガ

[0070]

And from light guide 98 of endoscope 93 , the

イド９８から、光源５６からの蛍光観察用の励起光を生体組織に照射する。この励起光の生体組織への照射により、生体組織からは自家蛍光が放出される。

excitation light for the fluorescent observation from a light source 56 are irradiated to an organism tissue.

The release of the self-fluorescence occurs from the organism tissue by the irradiation to the organism tissue of this excitation light.

【００７１】
この自家蛍光は、光プローブ９５内に設けたイメージガイド９４を介して高感度カメラ５７により撮像され蛍光画像処理装置５９に導かれ、モニタ６０に蛍光画像が表示される。

[0071]
This self-fluorescence is recorded with the high-sensitivity camera 57 via the image guide 94 provided in the optical probe 95, and is guided to the fluorescent image processing device 59, and a fluorescent image is displayed by the monitor 60.

【００７２】
また、ＭＲプローブ９７に設けたＭＲアンテナ９６により得られたＭＲ信号をＭＲ画像処理装置５８により処理することで、ＭＲ画像がモニタ６０に同じく表示される。

[0072]
Moreover, MR image is similarly displayed by the monitor 60 by processing MR signal obtained with the MR antennae 96 provided on the MR probe 97 by the MR image processing device 58.

【００７３】
（効果）本実施の形態においても、第４の実施の形態と同様に、病変部の表面の情報が蛍光画像として観察でき、また、病変部の深さ方向の情報がＭＲ画像として観察できるため、生体の表面情報のみならず、深部情報の観察も可能となり、診断能が向上する。

[0073]
(Effect)

Also in this embodiment, information on the surface of a disease part can be observed as a fluorescent image like the 4th embodiment.

Moreover, since data in the depth direction of a disease part can be observed as a MR image, not only surface information on the organism but an observation of deep-part information is attained, and diagnostic ability improves.

【００７４】
なお、ＭＲプローブ９７の代わ

[0074]
In addition, instead of the MR probe 97, an

りに、超音波プローブを用いて深部情報の観察を行ってもよい。

ultrasonic probe may be used and deep-part information may be observed.

【００７５】
また、図９に示した第１チャンネル９１及び第２チャンネル９２を有する内視鏡９３の代わりに、図１０に示すように、内径の太い大チャンネル１０１を有する内視鏡１０２を用いて蛍光観察装置を構成してもよく、この場合、大チャンネル１０１には、ＭＲアンテナ１０３が挿通された半円状のＭＲプローブ１０４及びイメージガイド１０５が挿通された半円状の光プローブ１０６が挿入される。このような構成でも本実施の形態と同様な作用・効果を得ることができる。

[0075]
Moreover, instead of the endoscope 93 which has the 1st channel 91 and the second channel 92 which were shown in a diagram 9, as shown in a diagram 10, fluorescent observation apparatus may be constituted using the endoscope 102 which has the large channel 101 with a thick internal diameter.

In this case, the semicircle-shaped optical probe 106 with which the semicircle-like MR probe 104 with which the MR antennae 103 were passed through, and the image guide 105 were passed through is inserted in the large channel 101, and the same effect of this embodiment can be obtained.

【００７６】
さらに、内視鏡１０２の大チャンネル１０１に、図１１に示すように、ＭＲアンテナ１０３を内蔵する中空状のＭＲプローブ１１１を挿入すると共に、前記ＭＲプローブ１１１の中空部にイメージガイド１０５を内蔵する光プローブ１１２が挿入し蛍光観察装置を構成しても、本実施の形態と同様な作用・効果を得ることができる。

[0076]
As shown in a diagram 11, while inserting in the large channel 101 of an endoscope 102 the hollow MR probe 111 which contains the MR antennae 103, furthermore, even if the optical probe 112 which contains the image guide 105 in the hollow part of the above-mentioned MR probe 111 inserts and it constitutes fluorescent observation apparatus, the same effect as this embodiment can be obtained.

【００７７】

[0077]

（第７の実施の形態）図１２は本発明の第７の実施の形態に係る蛍光観察装置の構成を示す構成図である。

(The 7th embodiment) diagram 12 is a block diagram showing the composition of the fluorescent observation apparatus based on the 7th embodiment of this invention.

【００７８】

（構成）本実施の形態は、外科処置に蛍光観察を応用したものであり、図１２に示すように、腹壁１２０を介して体腔内に挿入される硬性な挿入部１２１を有する硬性内視鏡１２２において、挿入部１２１の基端に連設されている把持部１２３には、挿入部１２１内に配設された第１のチャンネル及び第２のチャンネル（図示せず）に連通した第１のチャンネル口金１２４及び第１のチャンネル口金１２５が設けられ、把持部１２３に設けられた接眼部１２６にはイメージインテンシファイヤを内蔵した高感度カメラ１２７が着脱自在に接続される。

[0078]

(Composition)

This embodiment applies fluorescent observation to a surgery treatment.

In the hard endoscope 122 which has the hard insertion part 121 inserted intra-corporeal via abdominal wall 120 as shown in a diagram 12, the first channel metal_collet 124 and the first channel metal_collet 125 which were connected to the first channel and the 2nd channel (not shown) which were arranged in the insertion part 121 are provided in the holding part 123 currently articulated by the base end of insertion part 121.

The high-sensitivity camera 127 which contained the image intensifier is detachably connected to the eye-piece part 126 provided in the holding part 123.

【００７９】

そして、本実施の形態の蛍光観察装置１３０は、前記硬性内視鏡１２２と、高感度カメラ１２７からの信号を信号処理しモニタ１３１に蛍光画像を表示する蛍光画像処理装置１３２と、把持部１２３に接続され蛍光観察を行うために励起光を前記硬性内視鏡１２２に供給する励起用光源１３３と、第１のチャンネ

[0079]

And, for the fluorescent observation apparatus 130 of this embodiment, the above-mentioned hard endoscope 122, the fluorescent image processing device 132 which carries out the signal processing of the signal from the high-sensitivity camera 127, and displays a fluorescent image to a monitor 131, the light source for excitation 133 which supplies excitation light to the above-mentioned hard endoscope 122 in order to connect with the

ルロ金１２４から第１のチャンネルに挿入される病変部１３４を処置するための超音波破砕プローブ１３５を制御する処置具制御装置１３６と、第２のチャンネルにより第２のチャンネルロ金１２５を介して破砕した組織を回収する回収瓶１３７とを備えて構成される。

holding part 123 and to perform fluorescent observation, the treatment-tool control apparatus 136 which controls the ultrasonic crushing probe 135 for carrying out the treatment of the disease part 134 inserted in a first channel from the first channel metal_collet 124, and the recovery bottle 137 which recovers the tissue crushed via the 2nd channel metal_collet 125 by the 2nd channel. It has these and it is constituted.

【００８０】

（作用）硬性内視鏡１２２の挿入部１２１を腹壁１２０を介して体腔内に挿入する。そして、励起用光源１３３から蛍光観察用の励起光を硬性内視鏡１２２のライトガイド（図示せず）を介して腹腔内に照射する。すると、腹腔内の臓器の病変部１３４からは自家蛍光が放出され、硬性内視鏡１２２のイメージガイド（図示せず）を介して自家蛍光が高感度カメラ１２７に伝送される。そして、蛍光画像処理装置１３２で画像処理された後、モニタ１３１に病変部１３４の蛍光画像が表示される。

[0080]

(Effect)

The insertion part 121 of the hard endoscope 122 is inserted intra-corporeal via abdominal wall 120.

And, the excitation light for fluorescent observation is irradiated in the abdominal cavity via the light guide (not shown) of the hard endoscope 122 from the light source for excitation 133.

Then, the release of the self-fluorescence is carried out from the disease part 134 of the organ in the abdominal cavity.

A self-fluorescence is transmitted to the high-sensitivity camera 127 via the image guide (not shown) of the hard endoscope 122.

And, after image processing by the fluorescent image processing device 132, the fluorescent image of the disease part 134 is displayed by the monitor 131.

【００８１】

術者はモニタ１３１に表示された蛍光画像により、病変部の浸潤度合いを観察した後、第１の

[0081]

After the operator observed the permeation extent of the disease part by the fluorescent image displayed by the monitor 131, the

チャンネル口金１２４より第１のチャンネルに挿入した超音波破砕プローブ１３５及び処置具制御装置１３６を操作して、病変部１３４を破砕する。破砕された病変組織は硬性内視鏡１２２の第２のチャンネルを介して第２のチャンネル口金１２５より外部の回収瓶１３７に回収される。

ultrasonic crushing probe 135 and the treatment-tool control apparatus 136 which were inserted in the first channel from the first channel metal_collet 124 are operated, and the disease part 134 is crushed.

The crushed lesioned tissue is recovered by the external recovery bottle 137 from the 2nd channel metal_collet 125 via the 2nd channel of the hard endoscope 122.

【００８２】
（効果）このように、本実施の形態の蛍光観察装置１３０では、腹腔内の病変部１３４の位置確認、浸潤範囲の確認が容易となるため、治療を確実に行うことができる。

[0082]
(Effect)

In this way, it is with the fluorescent observation apparatus 130 of this embodiment. Since locating the disease part 134 in an abdominal cavity and to confirm the permeation extent becomes easy, treatment can be performed reliably.

【００８３】

[0083]

【付記】
（付記項１）　生体組織に励起光を照射し、前記生体組織から発生する蛍光により前記生体組織を観察する蛍光観察装置において、生体深部組織に穿刺する針状シースと、前記針状シースの前記生体深部組織への穿刺状態を確認する超音波観察手段とを備え、前記針状シースの内部に前記励起光を伝送する照明用光ファイバと、前記生体組織から発生する蛍光を伝送する観察

[Additional remark]
(Additional-remark item 1)　Excitation light is irradiated to an organism tissue.

In the fluorescent observation apparatus which observes the above-mentioned organism tissue according to the fluorescence generated from the above-mentioned organism tissue, it has the needle-like sheath transfixed to an organism deep-part tissue and ultrasonic observation means to confirm the transfix state to the above-mentioned organism deep-part tissue of the above-mentioned needle-like sheath.

用光ファイバとを設けたことを特徴とする蛍光観察装置。

The optical fibre for illumination which transmits above-mentioned excitation light inside the above-mentioned needle-like sheath, and the optical fibre for observation which transmits the fluorescence generated from the above-mentioned organism tissue were provided.

The fluorescent observation apparatus characterized by the above-mentioned.

【００８４】

（付記項２） 前記照明用光ファイバを介して照射した前記励起光に反応を起こす薬剤で前記生体深部組織の病変部を治療する治療手段を備えたことを特徴とする付記項１に記載の蛍光観察装置。

[0084]

(Additional-remark item 2) It had treatment means which carries out the treatment of the disease part of the above-mentioned organism deep-part tissue to the above-mentioned excitation light which irradiated via the above-mentioned optical fibre for illumination, with the chemical agent which undergoes reaction.

The fluorescent observation apparatus of the additional-remark item 1 characterized by the above-mentioned.

【００８５】

（付記項３） 前記薬剤はＰＤＴ用の薬剤であることを特徴とする付記項２に記載の蛍光観察装置。

[0085]

(Additional-remark item 3) An above-mentioned chemical agent is a chemical agent for PDT.

The fluorescent observation apparatus of the additional-remark item 2 characterized by the above-mentioned.

【００８６】

（付記項４） 前記薬剤はルミンであることを特徴とする付記項２に記載の蛍光観察装置。

[0086]

(Additional-remark item 4) An above-mentioned chemical agent is ?lumine?.

The fluorescent observation apparatus of the additional-remark item 2 characterized by the above-mentioned.

【００８７】
（付記項５） 前記薬剤はＴｉＯ２であることを特徴とする付記項２に記載の蛍光観察装置。

[0087]
(Additional-remark item 5) An above-mentioned chemical agent is TiO2.
The fluorescent observation apparatus of the additional-remark item 2 characterized by the above-mentioned.

【００８８】

[0088]

【発明の効果】
以上説明したように本発明の蛍光観察装置によれば、針状シースを生体深部組織に穿刺し、超音波観察手段により針状シースの生体深部組織への穿刺状態を確認すると共に、照明用光ファイバにより生体組織に励起光を伝送し、観察用光ファイバにより前記生体組織から発生する蛍光を伝送するので、生体の深部に存在する病変部の観察を行うことできるという効果がある。

[EFFECT OF THE INVENTION]
As explained above, according to the fluorescent observation apparatus of this invention, a needle-like sheath is transfixed to an organism deep-part tissue.
While confirming the transfix state to the organism deep-part tissue of a needle-like sheath by ultrasonic observation means, excitation light is transmitted to an organism tissue by the optical fibre for illumination.
Since the fluorescence generated from the above-mentioned organism tissue by the optical fibre for observation is transmitted, the disease part which exists in a deep part of the organism can be observed.
The above-mentioned effect is expectable.

【図面の簡単な説明】

[BRIEF EXPLANATION OF DRAWINGS]

【図１】
本発明の第１の実施の形態に係る蛍光観察装置の構成を示す構成図

[FIGURE 1]
The block diagram showing the composition of the fluorescent observation apparatus based on the first embodiment of this invention

【図２】
図１の光プローブを挿通する蛍光観察装置に用いられるコンベックス型超音波内視鏡の構成を示す構成図

[FIGURE 2]
The block diagram showing the composition of the convex type ultrasound endoscopy used for the fluorescent observation apparatus which passes through the optical probe of diagram 1

【図３】
図２のコンベックス型超音波内視鏡により得られた超音波画像を表示するモニタを示す図で

[FIGURE 3]
The diagram showing the monitor which displays the ultrasonic image obtained by the convex type ultrasound endoscopy of diagram 2.

【図４】
本発明の第２の実施の形態に係る蛍光観察装置の構成を示す構成図

[FIGURE 4]
The block diagram showing the composition of the fluorescent observation apparatus based on the 2nd embodiment of this invention

【図５】
本発明の第３の実施の形態に係る蛍光観察装置の構成を示す構成図

[FIGURE 5]
The block diagram showing the composition of the fluorescent observation apparatus based on the third embodiment of this invention

【図６】
本発明の第４の実施の形態に係る蛍光観察装置の構成を示す構成図

[FIGURE 6]
The block diagram showing the composition of the fluorescent observation apparatus based on the 4th embodiment of this invention

【図７】
本発明の第５の実施の形態に係る蛍光観察装置の光プローブの構成を示す構成図

[FIGURE 7]
The block diagram showing the composition of the optical probe of the fluorescent observation apparatus based on the 5th embodiment of this invention

【図８】
図７の光プローブをチャンネルに挿通した内視鏡の構成を示す

[FIGURE 8]
The block diagram showing the composition of the endoscope which passed through the

構成図

optical probe in the diagram 7 to the channel

【図９】
本発明の第６の実施の形態に係る蛍光観察装置の光プローブをチャンネルに挿通した内視鏡の構成を示す構成図

[FIGURE 9]
The block diagram showing the composition of the endoscope which passed through the optical probe of the fluorescent observation apparatus based on the 6th embodiment of this invention to the channel

【図１０】
図９の光プローブをチャンネルに挿通した内視鏡の第１の変形例の構成を示す構成図

[FIGURE 10]
The block diagram showing the composition of the first modification of the endoscope which passed through the optical probe in the diagram 9 to the channel

【図１１】
図９の光プローブをチャンネルに挿通した内視鏡の第２の変形例の構成を示す構成図

[FIGURE 11]
The block diagram showing the composition of the 2nd modification of the endoscope which passed through the optical probe in the diagram 9 to the channel

【図１２】
本発明の第７の実施の形態に係る蛍光観察装置の構成を示す構成図

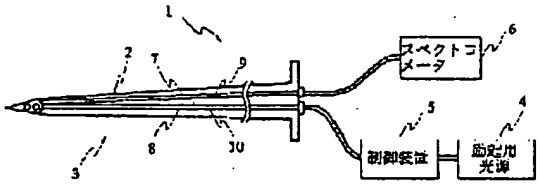
[FIGURE 12]
The block diagram showing the composition of the fluorescent observation apparatus based on the 7th embodiment of this invention

【符号の説明】
１…蛍光観察装置
２…シース
３…光プローブ
４…励起用光源
５…制御装置
６…スペクトロメータ
７…第１チャンネル
８…第２チャンネル
９…第１の光ファイバ

[EXPLANATION OF DRAWINGS]
1... fluorescence observation apparatus
2... sheath
3... light probe
4... Light source for excitation
5... control apparatus
6... spectrometer
7... The 1st channel
8... second channel
9... first optical fibre

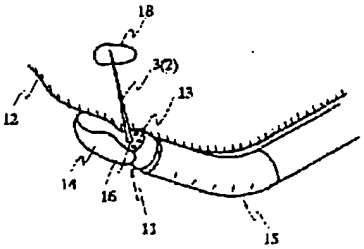
１０…第２の光ファイバ	10... 2nd optical fibre
１１…先端部	11... end
１２…生体組織	12... organism tissue
１３…対物光学系	13... object optical system
１４…超音波送受信部	14... ultrasonic-wave transmitting-and-receiving part
１５…コンベックス型超音波内視鏡	15... convex type ultrasound endoscopy
１６…チャンネル	16... channel
１７…外部モニタ	17... external monitor

【図１】 [FIGURE 1]

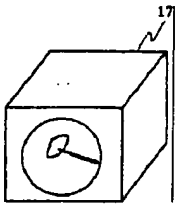


refer to EXPLANATION OF DRAWINGS

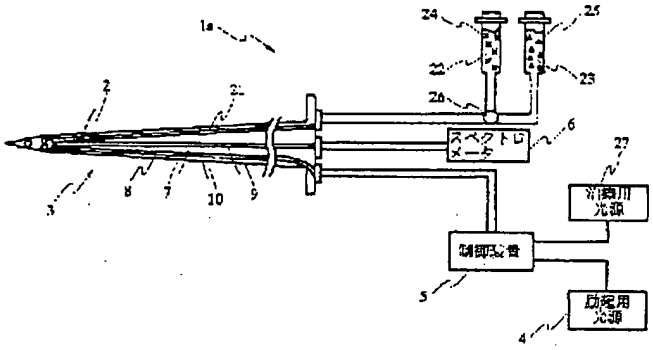
【図２】 [FIGURE 2]



【図３】 [FIGURE 3]

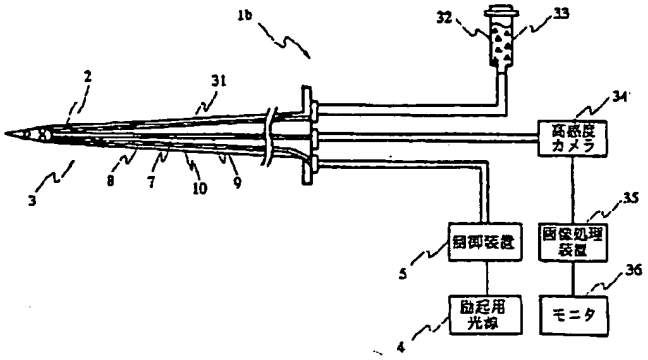


【図4】 [FIGURE 4]



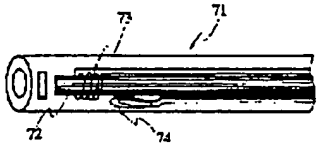
[translation of Japanese text in Figure 4]
refer to EXPLANATION OF DRAWINGS
27 therapeutic light source

【図5】 [FIGURE 5]

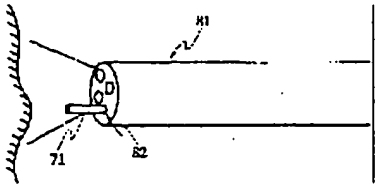


[translation of Japanese text in Figure 5]
refer to EXPLANATION OF DRAWINGS
34 highly sensitive camera
35 image processing unit
36 monitor

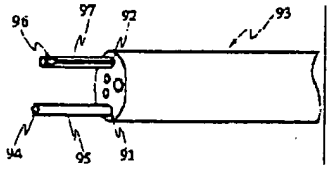
【図7】 [FIGURE 7]



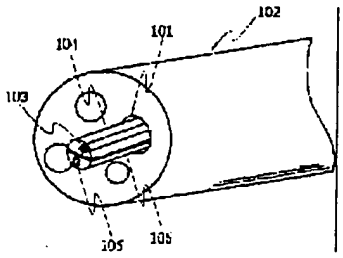
【図8】 [FIGURE 8]



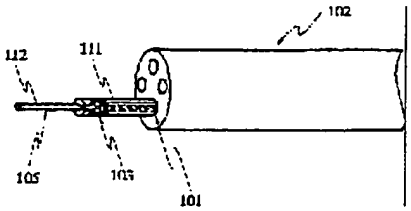
【図9】 [FIGURE 9]



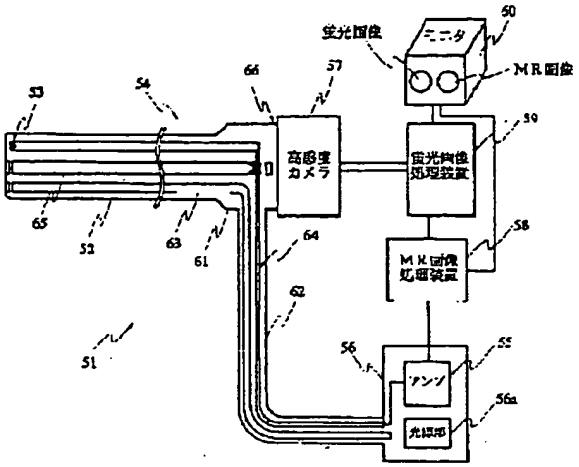
【図10】 [FIGURE 10]



【図11】 [FIGURE 11]



【図6】 [FIGURE 6]



[translation of Japanese text in Figure 6]

refer to EXPLANATION OF DRAWINGS

55 lamp

56a light source

57 highly sensitive camera

58 MR image processing unit

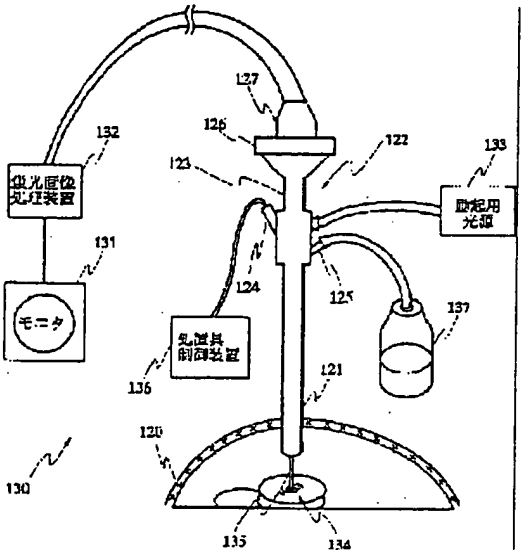
59 fluorescent image processing unit

60 monitor

60 *left circle* fluorescent imag

60 *right circle* MR image

【図１２】 **[FIGURE 12]**



[translation of Japanese text in Figure 12]

refer to EXPLANATION OF DRAWINGS

131 monitor

132 fluorescent image processing unit

133 excitation light source

136 tool control unit

DERWENT

DERWENT TERMS AND CONDITIONS